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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

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

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 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).

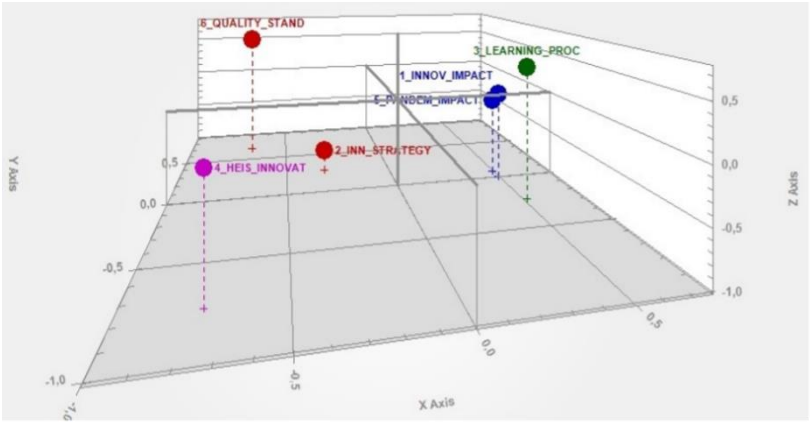

Figure 1 – Actor space (the first three factors explain 73% of inertia)

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

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

			work	90
			digital_innovation	80
			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.

[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

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 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.

REFERENCES

Callon, M. (1984). *Some Elements of a Sociology of Translation: Domestication of the Scallops and the Fishermen of St Brieuc Bay.* The Sociological Review, 32(1_suppl), 196–233. https://doi.org/10.1111/j.1467-954X.1984.tb00113.x

Carli R. and Paniccia R.M. (2002). *The Emotional Analysis of the Text: A psychological tool to read texts and speeches*. Franco Angeli.

Clark, B.R. (ed.) (1987). *The Academic Profession; National, Disciplinary, and Institutional Settings,* Berkeley: University of California Press.

Dobbins, M., Knill, C. & Vögtle, E.M. *An analytical framework for the cross-country comparison of higher education governance.* High Educ 62, 665–683 (2011).

https://doi.org/10.1007/s10734-011-9412-4

European Commission (2021). Digital Economy and Society Index (DESI) 2021: Thematic Chapters. https://ec.europa.eu/newsroom/dae/redirection/document/80563.

Johnson, B. and Hagstrom, B. (2005) 'The Translation Perspective as an Alternative to the Policy Diffusion Paradigm: The Case of Swedish Methadone Maintenance Treatment', Journal of Social Policy 34(3): 365–88.

Gaebel, M., Zhang, T., Stoeber, H. & Morrisroe, A. (2021). *Digitally enhanced learning and teaching in European higher education institutions.* European University Association absl.

Giuliano L. and La Rocca G. (2010). *Automatic and semi-automatic analysis of textual data: Research strategies and applications* (vol. II). Led.

Grasso M., Cordella B. and Pennella (2016). *The intervention in clinical psychology*. Carocci (Italy)

Greek F. (2016). *Integrate disability. An interdisciplinary methodology to read cultural change*. Franco Angeli.

Greco F. e Polli A. (2020). Emotional Text Mining: Customer profiling in brand management. *International Journal of Information Management,* 51: 101934,

https://doi.org/10.1016/j.ijinfomgt.2019.04.007.

Latour, B. (1986). 'The powers of association'. In: J. Law (ed.) Power, action and belief. London: Routledge.

Latour, B. (1987). *Science in Action - How to Follow Scientists and Engineers Through Society,* Harvard University Press, Cambridge, MA. Lebart L. e Salem A. (1994). *Textual statistics.* Dunod.

Lendvai, Noémi, and Paul Stubbs, 'Policies as translation: situating transnational social policies', in Susan M. Hodgson, and Zoe Irving (eds), Policy reconsidered: Meanings, politics and practices (Bristol, 2007; online edn, Policy Press Scholarship Online, 22 Mar. 2012),

https://doi.org/10.1332/policypress/9781861349132.003.0010, accessed 10 Jan. 2023.

Newton, T. (1996). Postmodernism and Action. Organization, 3(1), 7–29.

https://doi.org/10.1177/135050849631002

Reinert M. (1995). The lexical worlds of a corpus of 304 tales of nightmares through the "Alceste" method. In R. Cipriani and S. Bolasco, editors, *Qualitative research and computers. Theories, methods and applications.* Franco Angeli.

Steinbach M., Karypis G. and Kumar V. (2000). A comparison of document clustering techniques. In *KDD workshop on text mining*, vol. 400, pp. 525–526. Boston.

van Vught, F. (1996). *Isomorphism in Higher Education? Towards a Theory of Differentiation and Diversity in Higher Education Systems.* In V. L. Meek, L. Goedegebuure, O. Kivinen, & R. Rinne (Eds.), The mockers and mocked: comparative perspectives on differentiation, convergence and diversity in higher education (pp. 42-60). (Issues in higher education). Pergamon

Välimaa, J. Culture and identity in higher education research. Higher Education 36, 119–138 (1998). https://doi.org/10.1023/A:1003248918874

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					technological	0.26
cycle	0.15					third	0.26
help	0.15					issue	0.25
enhancement	0.14					improvement	0.25
Spain	0.13					solution	0.25
proposal	0.13					swot	0.25
describe	0.10					easy	0.25
college	0.10					effects	0.24
record	0.09					organizational	0.23
regard	0.09					efficient	0.23
gap	0.08					Best	0.22
abroad	0.08					possibility	0.21
million	0.08					force	0.21
place	0.08					communicate	0.21
confirm	0.07					solve	0.21
Levels	0.07					exist	0.20
economic	0.05					dissemination	0.20
conclusion	0.04					integrate	0.19
meet	0.04					integration	0.18
building	0.03					meeting	0.18
commitment	0.02					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		Pos Pole	
Pandemic		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

UNIVERSITY GOVERNANCE FACING CHALLENGES OF DIGITAL TRANSFORMATION.

SOME RESULTS OF THE FIELD RESEARCH

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ABSTRACT

Some studies show that most European HE institutions haven't made much progress in changing the courses they offer to a student centred learning model that can take into account developments and opportunities in technology-enhanced education. Challenges posed by digital transformation to universities do not regard only teaching and learning processes. There are different levels of institutional and organizational action which produce effects on these processes.

The paper presents some results of a part of the field research of the Erasmus+ Project ECOLHE. Six case studies have been carried out. They have aimed to investigate how the universities involved develop their strategic approaches to digitalisation. The results presented refer to the focus groups conducted in 2021.

INTRODUCTION

The world of universities is rapidly transforming, in continuity with what is happening in the global and national scenarios, but not without a bright internal debate on the contradictions of unplanned and few managed development, especially regarding the technological and digital issues.

Some major trends are changing the educational landscape and posing challenges for universities that wish to remain competitive: the nature of jobs is changing and students need to be able to update their skills throughout their careers; demand for continuous education and corporate training is growing; higher education (HE) faces serious capacity issues to deal with the global increase in student numbers; competition to attract the best students is increasing; public funding is decreasing as a share of revenue; research funding is increasingly skewed towards the top universities; Universities are collaborating more but increasingly selective; digitalized learning environments are becoming the norm and blended learning is becoming the main way of learning (Raetzsch et al., 2016).

Concerning this last challenge, ECOLHE (*Empower Competences for Online Learning in Higher Education*)[4] – an Erasmus+ Project, carried out from September 2020 to August 2023 – examines how the vision of digital learning in the European Higher Education Area (EHEA) is "translated into practice" (Latour, 1988; 2005) at national level by academic bodies. It aims to identify how digital challenges to promote lifelong learning through information and communications technologies (ICTs) in HE is shaped in specific contexts. ECOLHE aims to find out how universities involved adopt the European steering documents about how to use ICTs for HE; how digitalization contributes to transform teaching and learning processes or can help to do it, but also how it influences the action of Universities in their territorial context and in relations with the several stakeholders, in the perspective of a planning more

[4] https://ecolhe.eu/

participatory and bottom up; basically, how European recommendations and digital innovation processes are transposed into organizational practices.

Main ECOLHE's objectives and phases are: to analyse six case studies in HE, to examine how the universities involved develop their strategic approaches to digitalization; to implement online training to empower lectures and researchers to perform online and blended learning, more responsive to the qualitative dimensions of relationships; to develop innovative online environments for HE, enhancing the gamification tools; to develop a tool for the self-assessment of HE professionals based on the Symbiotic Learning Paradigm (SLP), a framework which, placing the learner at the centre, guides to a hyper-collaborative relationship between all stakeholders in HE; to provide guidelines, in order to propose Academic Bodies recommendations and tools to run digital transformation in HE; to favour social innovation in EHEA, also sharing good practices developed by partners[5].

The paper presents some results of the focus groups conducted during the first phase of the international research: the six case studies. They are the following: in Italy, eCampus University (presented by Fondazione Link Campus University, applicant of ECOLHE) and University Roma Tre (presented by CRES IELPO, a Research Center of the Department of Education[6]); in Spain, the Universitat Oberta de Catalunya; in Ireland, the Adult Continuing Education of the University College Cork; in Greece, the University of Patras and in Finland, the Laurea University of Applied Sciences.

THEORETICAL FRAMEWORK

The progress of the division of labour generates more knowledge-based work, new jobs and the rise of new social groups in search of recognition, as well as instability, precariousness and new forms of inequality (Butera & Di Guardo, 2010). In the knowledge economy, a worker is required to be increasingly educated and trained, creative, resourceful, flexible, autonomous and responsible; a significant dimension of the "know-how" aspect of work tends to expand. Greater responsibility attached to the role also means more complexity of the performances (Negrelli, 2013). Work environments are expected in the near future to be characterized by greater autonomy, less routine activities, greater use of ICTs, less physical exertion and greater social and intellectual tasks (Cedefop, 2018).

Organisations are increasingly characterized as learning organisations, subject to solicitations that transform their distinctive features in relation to structures, processes, but also to their culture, towards new logics, which are less hierarchical, more open, flat, networked and adhocratic (Cocozza, 2014).

Workers have to face a growing number of challenges, which have continually evolving implications: to adapt the ability to learn to new situations and problems, develop an ability to learn quickly. Coming times are those of research and discovery, information overload, compliance to legislation and making sense of data (Al-Kofahi, 2018).

The lifelong learning key competences (Council of the European Union, 2018) - as strategic resources for living and working - redefine the educational, political and social dimension which qualifies the relationship between state and citizen, in a new, more inclusive and democratic form.

In this framework, lifelong learning becomes a requirement, but also an entitlement.

Universities are tested about their capability to offer a fundamental contribution in the construction of this universal entitlement and giving it effective responses. The entitlement to learn lifelong and to see

[5] Further information on intellectual outputs and research reports of ECOLHE is available at: https://ecolhe.eu/outputs/.

[6] https://cresielpo.uniroma3.it/.

recognized own non-formal and informal competences is highlighted and today required by different European Union recommendations and national decrees and laws (Proietti, 2020).

A universal entitlement to lifelong learning "enables people to acquire skills and to reskill and upskill. Lifelong learning encompasses formal and informal learning from early childhood and basic education through to adult learning. Governments, workers and employers, as well as educational institutions, have complementary responsibilities in building an effective and appropriately financed lifelong learning ecosystem." […]

"Establishing an effective lifelong learning ecosystem is a joint responsibility, requiring the active engagement and support of governments, employers and workers, as well as educational institutions. For lifelong learning to be an entitlement, governments must broaden and reconfigure institutions such as skills development policies, employment services and training systems to provide workers with the time and financial support they need to learn. Workers are more likely to engage in adult learning where they are assured of continuity of income and labour market security. Employers' and workers' organizations also have a leading role to play in this ecosystem, including through anticipation of future skills requirements as well as participation in their delivery" (International Labour Organisation, 2019, pp. 11; pp. 30-31).

Universities are called to contribute to prepare students - and to accompany adult learners who return to study - for the challenges of today's world of work; to become "self-navigators" (Wyn, 2014); through innovative, multidisciplinary, open, pioneering learning processes.

Digital transformation can offer strategic opportunities in this direction. It is characterized by a fusion of advanced technologies and the integration of physical and digital systems, the predominance of innovative business models and new processes, and the creation of smart products and services"[7]. It is the use of technology to radically improve the performance or reach of an organization. In a digitally transformed business, digital technologies enable improved processes, engaged talent, and new business models[8]. In this scenario, the digitalisation is the series of phenomena that turn around the adoption of the outcomes of the process through which physical entities of different nature (three-dimensional objects, documents, sounds, images) are represented through a sequence of numbers (digits), usually in order to manipulate them by means of information technology (process known as digitization). The novelty of recent years, therefore, is above all in the process of creating digital data, which has reached ever more extensive processing capacities and which grow at an exponential rate combined with a progressive reduction in costs (Ambra, Pirro, 2017).

The transformation of organisational, professional and educational models that radically alter the rules, boundaries and autonomy of those who work daily in educational contexts, should suggest a global rethink of the education model and the idea of digital innovation to be pursued. Organisational processes and systems in their internal configurations (processes, procedures, internal and external communication systems, learning paths and environments, educational interventions, etc.) must be rationalised in order to integrate and exploit DTs, with the aim of making them more flexible and effective (Capogna, 2014; Capogna, Cianfriglia, Cocozza, 2020).

An organization has no other existence than that of the people who make it live (Morgan, 2014). Weick (1997) proposes to read organizations through the concept of *sensemaking*: a process based on the construction of identity; retrospective; establishment of sensitive environments; social; continuous; centred on (and from) selected information; driven by plausibility rather than accuracy. The meaning that digital transformation assumes for University is therefore given first by people who work in it and

[7] European Commission about digital transition available at https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/shaping-europes-digital-future_en.

[8] https://www2.deloitte.com/ie/en/pages/technology/articles/digital-enablement.html.

have constant relationships; while the impacts it produces are not always the desired ones, because, beyond the unexpected factors, the planning of the adoption of ICTs is not always systematic and built in a shared and bottom-up way.

DTs in educational institutions have the potential to be one of the main means of delivering quality education in line with their mission and vision. Their adoption and integration into educational systems implies changes in three basic dimensions: cultural, organizational and educational. The qualitative field research on ECOLHE focuses on them; they consider seven sub-dimensions of analysis based on the proposal of a *Digital Maturity Framework for Higher Education Institution* (Đurek, Begičević Ređep, Kadoić, 2019), a synthesis of the main existing frameworks related to the integration of DTs in HE: leadership, planning and management; quality assurance; scientific-research work; technology transfer and service to society; learning and teaching; ICT culture and ICT resources and infrastructure.

At European level, the European Digital Competence Framework for Educational Organizations (DigCompOrg) (Kampylis, Punie and Devine, 2015) is another interesting framework, useful to encourage self-reflection and self-evaluation within educational organizations as they progressively develop learning pathways and teaching methodologies for the digital era; to create the conditions for decision makers can design, implement and evaluate programmatic interventions aimed at integrating and using educational technologies effectively. The role of management in integrating and effectively using educational technologies to achieve educational goals is crucial. The strategic plan of an educational organization should take into account technologies as a key element of a long-term educational vision, well-articulated and clearly expressed. Visible actions related to the leadership and management of the organization can provide important support for the realization of this vision, which should be an integral part of medium to long-term planning. The concept of learning in the digital age is an integral part of the mission, vision and strategy of the educational organization. The strategic planning of the educational organization, together with its documentation, reflects a vision and a mission in which the potential contribution of technologies to favouring the modernization of educational practices, particularly in the generation of broader educational outcomes (Earp and Bocconi, 2017).

METHODS

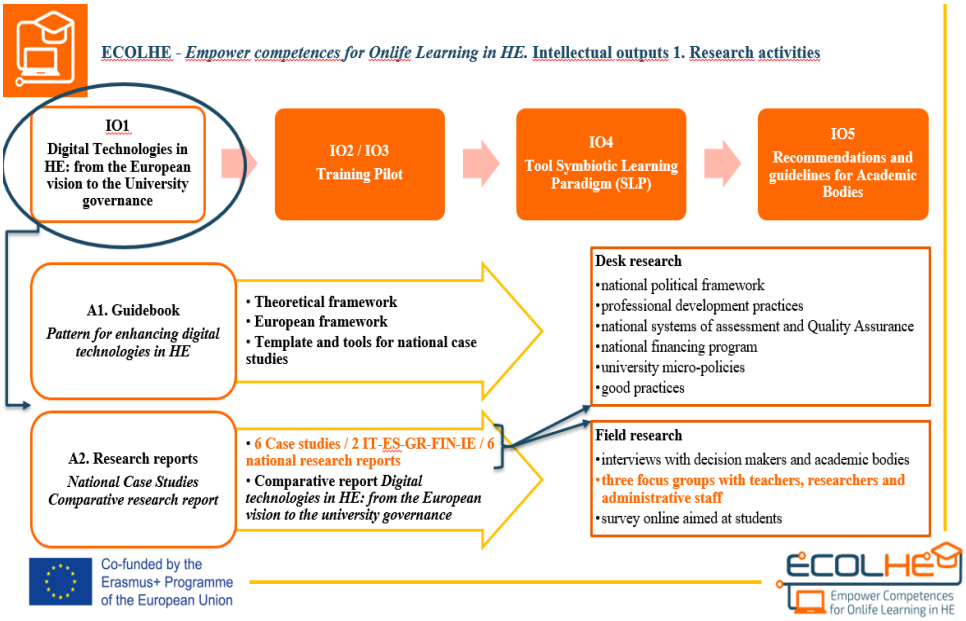
ECOLHE is an action-research (Barbier, 2007). To investigate the complexity of the phenomena, the field research adopts a mixed method, in which the team combines elements of qualitative and quantitative approaches.

The first phase of ECOLHE is organised in two main activities (Fig. 1).

The first one has the objective to elaborate a Guidebook *Pattern for enhancing digital technologies in HE* for the development of the case studies. It offers a theoretical background, a European framework about DTs in HE and a template and tools for the national case studies. The second activity has the objective to develop the field research: the research teams have realised the case study of its University; then, a comparative report on *Digital technologies in HE: from the European vision to the university governance* has been realised.

The six case studies, using an organisational empowerment approach (Capogna, 2018), aim to investigate some specific aspects of the evolution in the adoption of DTs in HE, from the European vision to the university governance and to examine how each university (unit of analysis) involved develops its strategic approaches to digitalisation.

Fig. 1 – Ecolhe. Research activities of Intellectual Output 1. Digital technologies in HE



The national research reports of the case studies have the objective of illustrating: needs and perspective of improvement of the use of DTs in HE; emerging teaching, researching and administrative staff competences for the digital era; the most important problems detected and possible solutions (suggested in according to a bottom-up approach).

They present the same structure, organised in two main parts, which describe the results of a desk research and the field research. The first one shows a reconstruction of the national political framework related to digital innovation in the national HE system; the professional development practices; the national systems of assessment and Quality Assurance in HE; the national financing program and a focus on university micro-policies by documentary analysis; university good practices of digital learning and smart-working.

The main phases of the field research are: in-depth interviews with decision makers and representatives of academic bodies; three focus groups with teachers, researchers and tutors and administrative staff (according to a qualitative approach); a survey online aimed at students to investigate their perception of the ability to integrate DTs into organizational and training processes supporting teaching and learning activities (according to a quantitative approach).

A total of 45 teachers, 35 researchers and tutors and 41 office workers have participated. In some cases, the focus groups had not the minimum number of participants suggested in literature (at least 6), but we have decided to use the results anyway because they have been still considered useful and interesting by the researchers, in line with the other evidences emerged.

The focus group is a data collection method: a detection technique for social research, based on discussion between a small group of people, in the presence of one or more moderators, focused on a topic that you want to investigate in-depth (Corrao, 2000). Data are collected through a semi-structured group interview process. The exchange of views of the various participants can promote a greater wealth of ideas and information on the topic.

The focus groups have been conducted using the questioning route method, which is often used in academic research. There has been a structured path in which the moderator has developed specific questions to which participants have responded verbally. The type of questions has been divided according to the degree of exploration to be achieved, using open questions. Main issues discussed are:

their digital innovation idea; organizational dimension of digital innovation; teaching practices and digital innovation; professional development with a focus on digital skills; good practices related to their own university; strength and weakness, opportunity and threat (SWOT analysis) in implementation of digital innovation in HE[9].

The next paragraph presents the main results emerging from the focus groups.

RESULTS

All we remember probably the key dates of the COVID-19 Pandemic. In December 2019, the Wuhan Municipal Health Commission (China) reported to the World Health Organization (WHO) a cluster of cases of pneumonia of unknown aetiology in Wuhan, in the Chinese province of Hubei. In January 2020, first, the new virus identified, then the new coronavirus transmitted from person to person and finally the first lockdown in the world begins, in Wuhan.

It means that during the development of our field research, and especially during the course of the focus groups (between March and June 2021), we have listened the reflections of colleagues on experiences made during the health emergency phase, and they are strongly affected by the impacts that a rapid, and sometimes disorganised, digital tools adoption have had on learning and organizational processes, during the 2020.

The results are presented in aggregate form and they concern three main investigation dimensions: organizational, teaching practices and professional dimension[10].

Regarding the organizational dimension, main results are the following. During the Pandemic, the need to resort quickly - even if not always effectively and efficiently - to ICTs to guarantee the continuity of teaching open up a wide debate on how to improve the integration of DTs at all levels in the HE. In all Universities, there is a good availability of digital tools, platforms and devices (e.g. TEAMS, ZOOM, CANVAS); in some cases, they were already present but not so used. All participants agree on the huge possibilities offered by the automation and the development of the dematerialization process, especially in the public administration. The use of DTs favours the development of relationships with stakeholders: for example, thanks to the increase of online meeting. All categories of participants highlight a greater work and learning flexibility, which, however, often coincide with an unclear difference between working time and free time. Some needs have been highlighted: to develop co-creative processes which integrate all staff, students, workplaces and digital tools; a greater technical support dedicated to teachers and administrative staff; a strong quality assurance system to guide and to evaluate the practices; a strong sharing culture for learning by best practices (also among universities); a shared vision and good competences (in digital, but above all in communication and relationship fields); a greater need for leadership (guidance, support and collaboration). A lack of a long-term digital vision in academic governance has been registered, which is considered crucial to accompany the skills and organizational development models, thanks to a bottom up approach. But all institutions should be prepared to receive innovative proposals and to share them, to develop a more learner centred approach. The key is to transform organizational dynamics into a learning organization model.

Regarding the teaching practices and DTs, main results are the following. The first and more important lesson learned is that online learning is not the transfer of the face-to-face method into the virtual world. It needs of solid methodological and pedagogical approaches. Especially in teaching, the technological and digital infrastructure and tools were there, but they weren't used. There has been a great diffusion

[9] Further information on methodological approaches and research results is available at: https://ecolhe.eu/outputs/. With particular reference to IO1 Report "Digital Technologies in HE: from the European vision to the university governance".

[10] Further information on the results of the six case studies is available on: http://ecolhe.eu/outputs/.

of DTs in learning processes, which has promoted a larger integration of research projects and teaching (easier thanks to the possibilities of online meetings). The outstanding use of distance learning has attracted more students and encouraged the inclusion of others. But a lack of didactic skills in a digital environment has been registered: by all staff involved, sometime by teachers, researches and administrative staff, but also by students (although most of them are considered digital natives). They have sometimes demonstrated a poor set of self-management skills. For university staff, the bigger lack has been that of time resources: too much work to do during all the day. So, the main lesson learned is that there are some weaknesses in using DTs in teaching practices governed largely by emergency measures, without a long-term vision.

Finally, regarding the professional development, main results indicate that digital competences of teachers and researches are still diverse and heterogeneous (and also of administrative staff). New ones are necessary: including mastery of the subject to be taught, of the language of instruction, of digital tools, pedagogical and communication skills, innovative mind-set, correct attitude, systems thinking and learning skills. Participants underline that there has been a good availability of internal training, including participating in organized courses, but above all reading, observing, peer discussions and experimenting with new tools on their own and trying to do our best have been the main opportunities. Essentially self-training. There has been a lack of time for personal development and no possibility of specialization. A significant weakness is the recognition of creative and hard work done, also due to the considerable adoption of old and new digital tools: participants say generally it is not appreciated and not valorised. The motivation to train or to adopt new methodologies are not connected with career progression. This situation could be one of the factors of a resistance to change, which all participants recognize as one of the greatest risks also for the academic community.

DISCUSSION

The main lessons learned by the research team on the basis of the results of the focus groups are the following. Traditional universities are expected to undergo a profound evolution to achieve the integration of online learning into their structured learning processes. Digital innovation is a vehicle for improvement, not a goal in itself. Universities should use technology to improve teaching, research and knowledge sharing, but the technology transfer is an application of knowledge transfer. So, develop knowledge remains the most important challenge for universities. The digital transformation proceeds step by step: some parts of the organisation proceed faster than other; this can be a trouble in the adoption of new DTs and innovative technological processes, for this reason training opportunities are recognised as a strategic choice. The intensive use of digital "forces" to deal with a new way of working: more digital, open, collaborative, agile, data-based and, above all, more transdisciplinary. A great convergence emerges regarding the idea that *digital* must remain a technology "at the service" of well-being of people and of knowledge.

CONCLUSION

The three dimensions briefly analysed are closely related. In the first one the vision, ideas, concrete projects of organizational development are born; they find application in professional practice: in teaching and learning processes, as well as in research and third mission –; but the administrative apparatus of the university is deeply involved too, because it works in essential support of these processes and actions. Not only that, it represents a wealth which is sometimes little used and valued in universities. From critical issues arises a new training need for all types of staff and from fully exploited training opportunities emerge the need for change and new ideas, new projects, innovation in essence, which must return to the organizational dimension. Otherwise the circle is not virtuous and the organization risks wrapping itself up. At an organizational level, several dimensions come into play: the structural one, the cultural dimension; organizational roles and coordination mechanisms (Cocozza, 2014).

In a scenario characterized by strategic vagueness and continuous change (Cocozza, 2023) – in a metamorphosis as Beck (2016) remembers us – in work and organizational processes, in life – as Pandemic pointed out –, in the economy of flexibility and indeterminacy, life cycle analysis of organisations should be recurring, carried out in an in-depth and participatory manner by all stakeholder representatives. Analysis and decision times are shortened and condition not only the set-up and functioning of the structures, as well as the articulation of processes, but they require a new organizational culture paradigm oriented marked by change and the enhancement of people and diversity present in organisations, assumed as a strategic asset to effectively carry out a real innovation project. An innovation that improves the results of the overall performance of the organisation, not in an ephemeral and transitory way, but in a lasting way, because it is based on a complete conscious and participated renewal of personal, professional, productive, administrative and organizational behaviours (Cocozza, 2014).

REFERENCES

Al-Kofahi K., *All is bringing a new set of rules to knowledge work*, Thomson Reuters, 2018, https://blogs.thomsonreuters.com/answerson/ai-knowledge-work/.

Ambra M.C. & Pirro F., "Digitalizzazione e lavoro: nuove sfide per il social investment approach", *La Rivista delle Politiche Sociali*, n. 3, pp. 79-94, 2017.

Barbier R., *La ricerca-azione*, Armando Editore, Roma, 2007.

Beck U., *The Metamorphosis of the World*, Polity Press, Cambrige, UK, 2016.

Butera F. & Di Guardo S., *Rappresentare e gestire il lavoro della conoscenza: un approccio per svelare e sviluppare broad profession*. *Working paper*, Fondazione IRSO, 2010.

Capogna S., "La valutazione come strumento di empowerment organizzativo e professionale", *Rassegna Italiana di Valutazione*, Vol. 70, pp. 99-117, 2018.

Capogna S., Cianfriglia L. & Cocozza A. (edt.), *Digital Culture for Educational Organizations. Guidelines for Teachers and Education Agencies,* University Press, Roma, 2020.

Capogna S., *Scuola, Università, E-learning. Una lettura sociologica,* Armando, Roma, 2014.

Cedefop, *Less brawn, more brain for tomorrow's workers. Cedefop briefing note, June 2018*, 2018, http://data.europa.eu/doi/10.2801/532551.

Cocozza A., *Organizzazioni. Culture, modelli, governance*, Franco Angeli, Milano, 2014.

Cocozza A., *The Unexpected in Action: Ethics, Rationality, and Skills*, Springer, Berlin, 2023.

Colella F., *Focus group. Ricerca sociale e strategie applicative*, FrancoAngeli, Milano, 2011.

Corrao, S., *Focus Group*, FrancoAngeli, Milano, 2000.

Council of the European Union, *COUNCIL RECOMMENDATION of 22 May 2018 on key competences for lifelong learning* (Text with EEA relevance), 2018.

Đurek V., Begičević Redep N. & Kadoić N., "Methodology for Developing Digital Maturity Model of Higher Education Institutions", *Journal of Computers,* 14(4), pp. 247-256, 2019.

Earp J. e Bocconi S., *Promuovere un apprendimento efficace nell'era digitale. Il quadro di riferimento europeo DigCompOrg sulle competenze digitali delle organizzazioni educative*, Istituto per le Tecnologie Didattiche, Consiglio Nazionale delle Ricerche (CNR), 2017.

International Labour Organisation, *Work for a brighter future. Global commission on the future of work*, International Labour Organization, Geneva, 2019.

Kampylis, P., Punie, Y. and Devine, J., *Promoting Effective Digital-Age Learning: A European Framework for Digitally-Competent Educational Organisations*, Publications Office of the European Union, Luxembourg, 2015, DOI: 10.2760/612227.

Latour B., *Reassembling the Social. An Introduction to Actor-Network Theory*, Oxford University Press, Oxford, 2005.

Latour B., *Science in Action. How to Follow Scientists and Engineers Through Society*, Harvard University Press, Cambridge, MA, USA, 1988.

Morgan G., *Images. Le metafore dell'organizzazione*, Franco Angeli, Milano, 2014.

Negrelli S., *Le trasformazioni del lavoro,* Laterza, Roma-Bari, 2013.

Proietti E., *Il lavoro nella learning society: la sfida delle competenze*, Roma TrE-Press, Roma, 2020, DOI: 10.13134/979-12-80060-07-5.

Raetzsch A., Thuaux-Alemán B., Rogers S., Berguiga M., af Sandeberg I. and Bricout V., *The future of higher education. Transforming the students of tomorrow*, Arthur D. Little, Bruxelles, 2016.

Weick K., *Senso e significato nell'organizzazione. Alla ricerca delle ambiguità e delle contraddizioni nei processi organizzativi*, Cortina Raffaello, Milano, 1997.

Wyn J., Conceptualizing Transitions to Adulthood, in Davis C.A. & Olson J.S. (eds.), *New Directions for Adult and Continuing Education. Special issue: Meeting the Transitional Needs of Young Adult Learners*, n. 143, pp. 5-16, 2014, DOI: 10.1002/ace.20100.

Yin R., *Case Study Research: Design and Methods,* SAGE Publications, New York, 2003.

Zack L., *Using a Multiple–Case Studies Design to Investigate the Information-Seeking Behavior of Arts Administrators*, Johns Hopkins University Press, Baltimora, Maryland, USA, Vol. 55, N. 1, pp. 4-21, 2006.

UNIVERSITY TEACHERS' DIGITAL EMPOWERMENT FOR BLENDED TEACHING: AN EXPERIENCE OF TEACHERS' TRAINING IN EUROPEAN HIGHER EDUCATION

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ABSTRACT

Due to the global pandemic, online training became a response for educational institutions to develop their training activities. HE teachers adopted remote solutions based on replicating face-to-face dynamics and activities online, while any online education activity needs a proper design to be developed and to assure students' meaningful learning. The results were not coherent with online teaching principles, causing a negative vision on online teaching and learning. To promote HE teachers' Digital Competence, an online course was designed, implemented and evaluated in six European universities. The process of design and implementation will be critically discussed to highlight the limit and opportunities of this training as a model to help teachers to transform their practices to blended teaching.

INTRODUCTION

Digital technologies were heavily integrated into all aspects of human life during the worldwide pandemic. When educational institutions used hybrid solutions to expand their training initiatives, online training emerged as a response.

Additionally, the need to respond to these changes made teachers aware of their own lack of digital competency—not from a technical standpoint, but from a pedagogical one. This fact has been found in the use of online teaching models based on the techniques they employ in face-to-face settings, without consideration of some elements that greatly differ in online settings, such as the interaction process, the potential for asynchronous communication, the redefinition of time and its management, or the requirement for more continuous, formative, and varied assessment processes.

HE teachers developed remote solutions focused on simulating face-to-face dynamics and activities in online settings (such as video conferencing technologies, for example) as a result of being unable to carry out their teaching practices in face-to-face settings. However, because any online educational activity requires a good design to be properly produced and to ensure students' meaningful learning, remote teaching cannot be regarded as online teaching (Hodges et al., 2020).

The results of remote teaching were inconsistent with online teaching principles as a result of this scenario and the solutions used, casting a poor light on online teaching and learning.

Blended learning (BL) is more than just the blending of in-person and online components. Armellini and Padilla (2021, p. 15) state that "BL is an approach that incorporates a range of dimensions that interact with and shape one another in an educational intervention". These dimensions are represented in a cross chart, where any BL proposal can integrate them between the extremes of each axis. Other factors that can be considered include, for instance: Individual work and collaborative work, peer assessment and tutor assessment, synchronous and asynchronous communication, etc.

1. KEY COMPONENTS OF ONLINE TEACHING AND LEARNING

Ten essential components for online teaching are briefly stated below, taking into account all of the aforementioned factors and based on more than 25 years of experience at the Open University of Catalonia (UOC) in online education:

Student's active role
Online learners must be engaged, capable of managing their own learning (autonomy), planning the creation of assignments or activities, mature, responsible, driven, and critical with the use of ICT tools, and committed to fostering social interaction through collaborative learning.

Competences
According to Paquette (2002), competence is the combination of knowledge (to know), skills (to know how), and attitudes (to be) that an actor needs to develop a function, duty, or role and to accomplish a goal, within a particular context and in accordance with the established conditions and established norms. The online training assessment procedure must be competence-centered in order to encourage students' acquisition of competences. Teachers must establish a number of assessment criteria throughout the design phase based on an examination of the evidence of students' knowledge, skill, and attitude growth during the creation of the online activities.

Active and collaborative methodologies
Active and collaborative approaches should be taken into account in order to maintain coherence in the design of online learning activities and to advance the first essential element of online teaching and learning. Among the possible methodologies, the work of Maina et al. (2019) can be consulted

Wide typology of e-activities
E-activities are activities created online that call for active student participation as well as teacher direction and orientation within the context of online learning. E-activities in online training should be built on collaborative design processes, problem-solving exercises, virtual debates, and inquiry processes with concrete substance.

Asynchronous and synchronous communication
Nowadays, a variety of tools encourage online interaction, which is particularly beneficial for the creation of online learning activities. However, when designing the online educational activities, communication must be developed in addition to the instruments. It is important to remember that in a fully online situation, synchronous communication cannot be the only method of communication.

Asynchronous communication is advised to develop reflective and knowledge-creation tasks, while synchronous communication can be very helpful for decision-making and consensus during the development of online collaborative activities. Asynchronous and synchronous communication can be used for different types of activities in the same online training.

Resources for teaching and learning
The choice of resources is one of the most crucial factors that must be taken into account when designing online learning activities. Because Open Educational Resources (OER) ensure that all students will be able to access and/or download them without issues or limitations, teachers must prioritize online resources and seek out OER.

Because there are so many materials available online, online teachers must choose resources based on a variety of criteria in order to ensure their academic quality. Kurilovas, et al. (2014) and Senter for IKT i utdanningen (2018) are two reliable sources to consult regarding the most crucial factors to take into account.

Continuous assessment
Because students can adjust their behavior to maximize their learning through constant feedback, continuous evaluation can enhance students' learning and help students acquire competencies. The teacher intends to assist the pupils in their learning by using the process of continuous assessment.

Teachers' role as a guide
In addition to allowing a sizable change in the role of students, the changes in educational models located outside of traditional settings have also altered teachers' roles. Today, the teacher is viewed more as a facilitator of students' learning rather than as a source of information and substance. a coordinator of education. In online training activities where students have more autonomy, this new function becomes increasingly clear.

Planning
In order to ensure the success of all the processes, it is crucial to organize online teaching and learning activities. Each activity and task must be carefully designed, and the online instructor must be able to synchronize not only the performance of the students but also all the procedures that enable online learning.

The stable learning environment and well-bounded tools
The environment and resources used in any online learning and teaching activity must be carefully chosen to ensure that they support the development of the various activities. Online teachers need a variety of selection criteria to enable them to choose the best tools to develop the activities they design. As a result, it is essential that they have a minimum level of technical knowledge to assist them in choosing an environment and tools that are simple to use, offer device interoperability, and are up to date.

2. TRAINING PILOT FOR ONLINE TEACHING IN HE: BACKGROUND, DESIGN AND DESCRIPTION

European HE teachers' training has been developed using an integrated approach that draws on the ten essential elements of online teaching and learning.

The proposed training, developed within the framework of the European project Empower Competences for Onlife Learning in HE (ECOLHE), was created by academics from the Open University of Catalonia. It will be implemented in six European nations (Italy, Spain, Ireland, Greece, Cyprus, and Finland).

Participants in the pilot were involved in creating, implementing, and evaluating their own online activities in addition to receiving theoretical training on online education. In several training phases, the participants will take on the roles of teachers and pupils while working cooperatively in teams.

In terms of planning, the training pilot was divided into two synchronous and four asynchronous activities, with a 30-hour burden overall.

The training's activities were divided up as follows:

Introduction. Synchronous.
This activity, developed in a webinar format, consists of a synchronous activity sharing the training with the involved partners, including an introduction, training development, methodology, materials, etc

Activity 1 - Analysis of a learning activity. Asynchronous.

During this activity, participants analyze an online training proposal developed by UOC for students. In this activity, participants work in collaborative groups, guided by a template and share their analysis with the rest of the participants. This activity is focused on knowledge of a set of digital resources (OER) organized by the seminar competences (see section Competences and Continuous assessment).

Activity 2 - Activity design. Asynchronous.

In this activity, participants apply what they learned during the first activity and collaboratively design a blended learning activity addressed to their students.

Activity 3 - Activity implementation. Asynchronous.

Each university manages two of the designed learning activities playing two roles. As teachers implementing one of these activities, and as students performing the other activity designed by another group.

Activity 4 - Activity evaluation. Asynchronous.

Each group evaluates the implemented activities following an evaluation guide provided by UOC.

Conclusion and training evaluation. Synchronous.

The evaluation of the pilot is based on continual evaluation and considers the various agents involved in the learning process. Participant activities involving self- and co-assessment are another active component of the evaluation process. In order to do this, a set of rubrics is developed to assess the degree of skills attained. Additionally, a final synchronous activity was carried out with the participation of every participant to assess the training pilot.

3. PILOT TRAINING FOR ONLINE TEACHING IN HE: IMPLEMENTATION AND EVALUATION

The pilot program was intended for professors, tutors, doctorate and post-doctoral students, and researchers who were interested in developing their online teaching methods. As was already noted, 40 of the 128 participants in the pilot course completed it. The following table analyzes the evolution of the participation count:

# Enrolled Participants	Intro	ACT 1		ACT 2		ACT 3		ACT 4	
	P	G	P	G	P	G	P	G	P
128	71	13	48	11	40	11	40	11	40

Table 1: Training pilot number of participants evolution: P = People and G = Groups

Each partner evaluated the qualitative aspects of each pilot experience. These contributions served as the basis for this evaluation's data collection. Due to the wide range of participant characteristics and variations across the participating institutions, certain lessons can be gleaned.

Each partner shared a "National Report" with the rest of the partnership in the form of a summary paper based on these qualitative evaluations and the monitoring carried out throughout the pilots.

Each of the key elements of online teaching and learning is examined to create this part, using national reports as a guide.

In some circumstances, the discussion combines the evaluation of more than one component to streamline the evaluation's content. For each component, italicized passages from the partners' national reports are mentioned.

Competences and Continuous Assessment

A few competences were chosen to be developed through the suggested activities for the training, including professional collaboration, selecting digital resources, assessment strategies, feedback and planning, and eight additional competences chosen from the DigCompEdu framework.

Participants without experience in online teaching or in team work reported that their lack of experience in these areas made it harder for them to learn during the training:

- *The material provided often assumed basic knowledge that was not encountered in all participants. The group work was also carried out thanks to the previous knowledge of some participants (ROMA 3).*
- *Concerning online teaching, participants expressed their concerns during the online webinar about their ability to become familiar with the platform in a short period of time (UPATRAS).*

Therefore, it is essential to confirm prior understanding of these essential competencies before enrolling participants in training that involves both online and group work.

Active and collaborative methodologies and Wide typology of e-activities

The coordination amongst other group members was expected to be a significant problem for those participants with no prior expertise in collaborative work:

- *You cannot expect teachers from a variety of disciplines to know these theories and practices therefore this should have been supplied as part of a course that relied on their use to complete it (UCC).*

However, after this first challenge is overcome, training becomes a fantastic opportunity to reach new learning objectives since collaborative work provides the chance to benefit from the experience of other colleagues:

- *The interaction in teamwork with people from different disciplines was a challenge at the beginning, but once the common objectives and themes of the activities were established among them, working with people from other disciplines was very enriching (UOC).*

Regardless of the assignments each course activity suggests, it's crucial that participants' existing activities or those they use in their regular classes can be incorporated into or modified:

- *The first proposal is that the course could have additional learning paths aligned with the traditional one. There are students that could be motivated if they had the possibility to report/publish their existing development work or who are willing to develop e.g., a new study unit (LAUREA)*

Asynchronous and synchronous communication

Participants discuss this topic's use of asynchronous or synchronous communication as well as its substance, which are two connected aspects. The more online experience the university has, the easier and more beneficial asynchronous communication is judged in terms of which type of communication is best for them:

- *The asynchronous nature of the pilot made them feel uncertain about their progress in case of a weak understanding of the structure and the tools, and the effort it would take to tackle any obstacles. There was no familiarity with the specific asynchronous teaching platform (UPATRAS).*

Therefore, developing more confidence and understanding of asynchronous communication performance should be one of the initial learning objectives before implementing a training program like the ECOLHE pilot training.

Regarding its substance, even in institutions with more online training, periodic synchronous encounters to clarify some of its more practical elements are encouraged:

- *The synchronous session could have focused on the specifics of completing the course rather than the big-picture overview of the design (UCC).*

Synchronous meetings were employed in various grades to fill an expanding need for communication between group members or between participants and e-facilitators.

The recommendation regarding the introduction of asynchronous communication in online training is to do it gradually, better if there has been prior training specifically about asynchronous communication, and incorporate some synchronous sessions into the design of the training to see if there are any areas that could be improved or clarified.

Resources for teaching and learning

All of the participants gave the quantity and quality of the suggested reading material very high ratings, with two suggestions on how to enhance the training.

Some participants requested films to further explain certain aspects of the training:

- *A variety of both video and text resources is best practice for self-directed courses (UCC).*

About the second consideration, there are contradictory opinions among participants:

- *The documentation shared on the platform is very complete and of quality. It is very positively valued that access to the necessary information for each activity is facilitated, as well as the infographics highlighting the most relevant information of each phase of the training (UOC).*
- *The amount of materials could be reduced. In particular, the additional teaching material - additional readings and informative documents - has lengthened the time and dispersed the concentration (ROMA 3).*

This issue needs to be made very apparent in the presentation of the training materials.

Student's active role, Teachers' role as a guide and Planning

In all cases it was necessary to adapt the initial planning, for different reasons: due to the initial difficulties in managing the platform, or to the lack of confidence and experience of the participants in online learning, or to an excessive workload that the course entails for the participants.

- *The training participants had a tight personal working schedule and it was obvious that the original course schedule was too demanding for them. The instructors extended the course deadlines, (LAUREA).*

These modifications to the strategy had an impact on participants' motivation and boosted participation from the e-facilitators.

The participants must take an active part in the training. Depending on each participant or institution, and the online teaching-learning experience, this involvement was highly diverse. For instance, participants in UOC overcame initial challenges by taking the initiative and looking for alternate solutions in each group, but participants in UPATRAS lost some of their enthusiasm owing to the necessity of being actively participating online:

- I*nitially, at the beginning of the online course,... This made them feel uncertain about their ability to follow the rest of the course and weighed negatively on their motivation (UPATRAS).*

The program is based on the UOC model, and there is a significant amount of instructional presence, with the teacher accompanying the students at all times. The e-facilitators must be present all the time. Teachers who have never taught online naturally assume that this is not the case since, in conventional universities, teaching presence is associated with being in-person. The workshop also aimed to alter this perception and provide participants with tools to virtually follow students. This was not always accomplished, but the method used by some institutions to get over obstacles in this area is highly impressive, as demonstrated by the actions of the UCC teachers:

- *In the end there was not merely a need for adaptation but the facilitator joined three of the four teams as a participant on the course and this was the only way that those participants were able to complete the course. The participants who needed this much support to complete the course were all from the higher education sector highlighting that this design does not meet the needs of educators in this sector. This is in stark contrast to the experience of the two participants from the further education sector who completed the course ahead of schedule and with no need for adaptation or assistance from the facilitator (UCC).*

The distinctions between people who have various experiences with new technology used in education are also explained in the previous paragraph. It is crucial to modify the course for instructors who are less accustomed to online teaching-learning.

The stable *learning environment, and well-bounded tools*

The Moodle platform's use has influenced the experience within the training. It can be said that those participants who were accustomed to using this platform had a positive experience whereas those who were not did not.

- *The second challenge was the course environment itself (Moodle). The instructors were not familiar with Moodle, and it took some time to figure out how Moodle works (LAUREA).*
- *In general, it is possible to state that the participants showed good motivation and had no problems using the Moodle platform, as they are used to using it in university activities. So the online activities had no problem getting carried out (ROMA 3).*

This idea is further supported by the requirement that participants receive pre-training in order to provide them with the background knowledge required to fully engage in online teaching and learning.

SUMMARY OF KEY CONSIDERATIONS

The use of technology to offer alternatives to face-to-face teaching offers opportunities to HE institutions, due the flexibility and ubiquity of online teaching are rising values.

There is not a single training system applicable to all institutions. It is necessary to make enough flexible training proposals to be adapted (and adopted) by each teacher.

Collaborative work and the use of asynchronous communication are two key competences to ensure success in online training (and both require the active role of the participants).

Therefore, a pre-training to the participants and another one addressed to the e-facilitators to offer all the background necessary to go deep in online teaching-learning and knowledge of the training platform and toolset.

Promote that the activities that the participants use in their day-to-day courses can be integrated or adapted to an online environment

Incorporate in the design of the training some synchronous sessions to check if there are any aspects to improve or clarify.

REFERENCES

Armellini, A., & Padilla Rodriguez, B. C. (2021). Active Blended Learning: Definition, Literature Review, and a Framework for Implementation. In Rodriguez, B. C., & Armellini, A. (Ed.), Cases on Active Blended Learning in Higher Education (pp. 1-22). IGI Global. http://doi:10.4018/978-1-7998-7856-8.ch001

Hodges, C., Moore, S., Lockee, B., Trust, T. y Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review. https://bit.ly/3b0Nzx7

Kurilovas, E., Serikoviene, S. and Vuorikari, R. (2014). Expert centred vs learner centred approach for evaluating quality and reusability of learning objects. Computers in Human Behavior, 30, pp.526-534

Maina, M., Morales, Mª de los Ángeles, Ollé Terrés, M., Rodera Bermúdez, A. & Guàrdia Ortiz, L. (2019). Metodologías activas [WP: sitio de tipo galería]. PID_00263962.

Paquette, G. (2002). Modélisation des connaissances et des compétences: Un langage graphique pour concevoir et apprendre. Québec: Presses de l'Université du Québec. doi:10.2307/j.ctv18ph0w2

Sangrà A. (Coord.) (2022). Improving Online Teaching. Practical Guide for Quality Online Education. Editorial UOC-IAU.

Senter for IKT i utdanningen (2018). Quality criteria for digital learning resources. Norway

ONLINE TEACHING IN HIGHER EDUCATION AFTER THE PANDEMIC EXPERIENCE: GUIDELINES AND RECOMMENDATIONS

Conclusions from the pandemic era experience

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ABSTRACT

In the years during the pandemic, there was a dramatic conversion in the traditional operation of universities. Until then, distant teaching was used rarely, or not at all. To fulfill their role and continue their operation in quarantine times, traditional Higher Education Institutes (HEIs) transformed their teaching services from in situ into fully distant, keeping it this way for at least two years. A critical question is whether they should return to their usual teaching methods or transform their operation, based on their experience from distant teaching. The present work uses the collective work of ECOLHE Project to outline the effect of new teaching methods in Higher Education (HE) during and after the pandemic. During a three-year research, ECOLHE project investigates the way that Universities have forwarded the enhancing of ICT resources in HE, through the realization of six case studies in partner countries HEIs. Furthermore, the Project developed a pilot implementation of an online environment as an online teaching tool to increase HE teachers' ability in the usage of digital technologies. Next step was the creation of a Serious Game aiming to study users' development of new skills and new ways of solving problems. Also, a self-assessment tool was implemented aiming to define and evaluate the level of innovation in HE institutes. Summarizing the extensive work of the previous steps conclusions were drawn that lead to the formation of Recommendations and Guidelines regarding the Academic Bodies, with the target of addressing the challenges for modern educational systems.

I. INTRODUCTION

Digital transformation in Higher Education (HE) consists a major priority for the European Union (EU). In the years to come a reconstruction of the Higher Education Institutions (HEI) in all levels of their operation will take place. With the adoption of Digital Education Action Plan (2021-2027) [1] on 30 September 2020, EU sets the target of a high-quality, accessible and inclusive digital education, supporting the Member States for their entry to a digital era.

EDUCAUSE [2] defines digital transformation as "a series of deep and coordinated culture, workforce, and technology shifts that enable new educational and operating models and transform an institution's business model, strategic directions, and value proposition.".

In previous years, there was a constant growth of Students Centered Learning models and students' satisfaction surveys became a common reality within many universities' part of EHEA. These surveys offer some of the most efficient solutions in order to assess students' perspective on teaching and learning, but also to see their perception regarding other elements of a HEI [3]. To move towards to digital transformation HEIs should take into consideration what [4] marks "…while the dynamics for

change and transformation come from learning and teaching practice, their sustainability and success depend on institutional and, to some extent, on system-level strategies and support…". Also, it should not be neglected that "The effective implementation of digital pedagogy along with symbiosis learning methods can significantly improve the quality of learning and teaching in European HE Area [5].

As mentioned in [6] the central goals of Digital Transformation (DT) in HEIs are related to improving infrastructure, business process, administration, teaching, curricula, job access, market openness, research, and digital marketing. Novel aspects to consider are technology, management systems, business frameworks, digital technology, computers, and software. On line teaching is a major tool to support these goals.

A pioneer of these radical changes is the ECOLHE project which, through its research, tries to contribute in enhancing and promoting e-learning with high quality standards. For that purpose, during the past three years an extensive work took place which led to five high quality Intellectual Outputs (IOs). These IOs are the backbone of the work which led to the formation of various recommendations to Academic bodies regarding their way to Digital Transformation.

In the rest of the paper the methodology of the research presented in section 2 and the outcomes of each IO in section 3. The results of ECOLHE research which form the recommendations and suggestions to Academic Bodies according of the findings are given in section 4. These recommendations and guidelines are formed in consistency with all previous ECOLHE IOs and European directives with the ambition to form a useful guide for the Academic Bodies in their way to the digital transformation of their services.

II. ECOLHE RESEARCH METHODOLOGY

The ECOLHE project is guided by one overall research question: "How do Universities promote innovation and digital challenge in their processes and learning-teaching activities?" [7].

To answer the above question, ECOLHE research, in the first step (IO1), adopts a mixed methodology (qualitive and quantitative) [6],[7],[8] by the realization of six case studies. HEIs which participated were from Italy, Spain, Greece, Ireland and Finland forming ECOLHE consortium. Case studies were separated in two parts: Teachers' perspective and Students perspective. For the first part, interviews from Academic key actors were taken and for the second, a field survey was caried out gathering students' opinions regarding their HEI digital innovation and overall experience. For that purpose, 1148 students from universities of the participants countries answered a carefully design questionnaire which aimed to explore the following sections: teaching innovation, students' achievement, and students' experience.

In the second step, an Online Training Pilot for improving teachers in HE course was created in order to capture the challenges and the possibilities of Online teaching. Each HE caried out the course and extracted useful conclusions regarding OnLine teaching and enhancing new teaching methods and tools [8]. The proposed training was designed by teachers from the Open University of Catalonia and developed in the framework of the European project Empower Competences for Onlife Learning in HE (ECOLHE). It was implemented in 6 countries around Europe, Italy, Spain, Ireland, Greece, Cyprus and Finland. The findings define ten key components of online teaching and learning, presented in more detail in [9].

Third step investigates Gamification from teachers' perspective [10] through the course developed in step two.

The fourth step creates a pilot method of Symbiotic Learning Paradigm (SLP) for the design of a curriculum [11].

Final step of the research gathers all the above research findings and forms recommendations and guidelines for Academic Bodies, which compose a framework regarding Digital Innovation in HEI.

III. ECOLHE RESEARCH RESULTS

In the first step of research, a comparative analysis of national reports [12] was created. Main conclusions of [8] and [12] is the extraction of six development topics (clusters) that HEIs should take into consideration regarding the promotion of their digital transformation and the development of their digital strategies, according to the analysis of interviews between key actors of HEI operation and management. These clusters are:

1. Digital innovation impact.
2. Digital innovation strategy.
3. Digital learning process.
4. HE institution digital innovation.
5. Pandemic's impact on the teaching-learning experience.
6. International Quality Standards.

The field research results consist of students' perspective during their studies and their expectations afterwards. Five latent factors were revealed that characterize students' digital maturity: Digital Tuning; Teaching Innovativeness; Soft Skills; Employability; Positive Relationships. According to these factors, students were classified into seven clusters: Self-realization Focused (26,7%); Social (19,6%); Teacher Centered (15,6%); Job focused (14,1%); Lone Riders (10,2%); Task-oriented (8,9%); Cosmic Pessimists (4,9%). In parentheses are the percentages of students belonging in each category.

Regarding the Online training pilot [9], results reveal that Participants without online teaching experience and/or without collaborative work experience faced difficulties during training due to their lack of knowledge in both competences.

Along the process it was revealed that collaborative work offers a lot of opportunities, due to exchange of information and knowledge with students with more experience. Also, proper training of facilitators is essential for the successful procedure of the course. Digital environment knowledge is also very important for participants so that they can explore the course material, upload and download projects, submit questions and receive feedback from facilitators.

Gamification methods were used during the course and reveal several advantages and disadvantages in teaching procedure [10]. The most important advantages are that gamification improves knowledge absorption and retention; foster motivation and engagement; provides immediate feedback to help learners adjust to learning challenges; applies and practices learning within a meaningful and authentic context; promotes cooperation and teamwork. On the other hand, gamification absorbs teaching resources and is time-consuming for the teacher; replaces other learning activities such as hands-on experiments and simulations; blurs boundaries between virtuality and reality, and sometimes we believe that as we are in a game, there are no consequences. Gamification presents also difficulty in adapting the gamified activity to different types of student motivations and does not meet learning needs of all learners. Furthermore, may it lead to overstimulation, or game play addiction.

SLP use in the design of a pilot curriculum [11] aligns with what academic teaching staff view are the key competencies that the curricula they design need to 'teach' their students. Also it offers a flexible approach that can be used by teaching staff who wish to explore teaching competencies that are relevant to the specific curriculum but it does not offer a prescriptive competency framework to use to self-assess teacher competencies and/or design professional development programs. Finally, at [11] analysis outcome finds that SLP is a participatory approach to curriculum design with the inclusion of learners as stakeholders in the design of their own curricula - not learners and stakeholders but learners as stakeholders.

Taking into consideration all the previous analysis results, in the following section, recommendations are suggested to Academic Bodies in order to form their digital agenda in such a way as to efficiently fulfil their operation needs and successfully proceed to a new digital education era.

IV. RECOMMENDATIONS TO ACADEMIC BODIES REGARDING DIGITAL TRANSFORMATION IN HEIS.

Suggestions were separated according to the perspective of Academic staff and students and the results of pilot training and SLP usage findings.

i. Recommendations regarding HEI digital impact

First part has to do with the development of the six clusters presented in [12]. Our scope is to increase the positive elements which compose HEIs digital development and reduce the negative ones.

Factors which increase ***digital impact*** are infrastructure, technical and pedagogical support and a widespread culture of sharing. On the other hand, lack of time, digital skills and recognition of the value of work in a digital environment represent the main obstacles to digital innovation in Higher Education.

Digital infrastructure should be the priority for HEIs in their way to digitalization. One of the guiding principles of EUs' Digital Education Action Plan (2021-2027) [1] refers to: "Appropriate investment in connectivity, equipment and organizational capacity and skills should ensure that everybody has access to digital education". That means that HEIs should be able to provide network connectivity to training, administrative staff and students and also the equipment and network capacity to perform their scope and their goals. That translates in developing of institutes network capacity and speed, via network upgrade where necessary, and enhancing network support administrative services. HEIs network should be reliable, fast and able to support thousands of users during the academic year and of course technical staff should be well prepared to deal with any malfunction which should be repaired in a very short time.

That leads to the second factor which is ***technical and pedagogical support***. Technicians are the corner stones for HEIs facilities function. Thus, they must be well trained, experienced and for that reason, HEIs should provide to them, regularly training seminars in order to keep them up to date with the latest technology features. The number of technicians also should not be neglected. HEIs should be able to hire the necessary number of technicians according to institute needs. For that purpose, essential factor is institutes funding.

Pedagogical support is also very important because professors and tutors must be up to date and beyond with the latest teaching tools and methods. For that reason seminars and teacher training should be organized regularly from HEIs, as well as exchange of best practices with other HEIs of the same country and abroad. Exchange of good practices and is the best way to foster methods that have been already tested and worked in other institutes. Of course, any new methods should be adjusted with native culture and legislation.

For the increment of the digital innovation impact the drawback factors should be limited to minimum. ***Lack of time*** is one of them. There should be enough time for HEI staff to fulfill their scope and also a well-made scheduling to be able to get informed through the training seminars mentioned before. Teachers' digital skills should be upgraded. The majority of teaching staff follow the same teaching methods right from the beginning of their career and they are reluctant to change it, because of doubts about the cognitive outcomes of their course and the physical inertia that comes naturally with age. Polytechnic schools' teachers are more equipped with digital skills because it is in the nature of their work. Teaching staff of other schools' digital skills are not so well developed so they should be provided with information and training on digital practices and tools.

Digital learning process mainly focuses on people interaction. To be more specific, it presents how teachers and students face the process of teaching and learning online. ECOLHE research reveals that countries with low *Digital Economy and Society Index - DESI* (Italy and Greece) seem to pay more attention to digital learning process. For the improvement of that factor, HEIs it is recommended that HEIs could:

- Create conditions for digital development.
- Ensure availability of face-to-face lessons and online using blended methods.
- Promote asynchronous methods of teaching and learning.
- Create high-quality standards that ensure the high level of knowledge which must be provided.
- Improve students' digital skills through well designed courses.
- Improve teachers' digital methods with the introduction of new ways of teaching.
- Design pilot digital courses using innovating tools, such as Symbiotic Learning Paradigm (SLP).
- Design and implement quality tools which will ensure an immutable examination process.
- Continue monitoring, validation and evaluation of teaching and learning process.
- Make online courses more appealing and easier to attend.
- Introduce and empower technical tutors.
- Provide knowledge and tools to tutors in order to support and monitor students' progress.

Digital innovation consists an important issue in countries with low DESI such as Greece and Italy, while in countries with high DESI, such as Spain, Finland and Ireland digital innovation is already in high level. Notice that unlike other countries, Spain's' university is fully online, so good practices from its operation could be followed by other HEIs, with the scope to increase their digital innovation factor. For that purpose, the creation of an e-Learning center is recommended which will translate, in an institutional way, the innovating experiences emerging from fully online HEIs best practices. E-Learn Center should monitor and evaluate the implementation of digital methods and adjust it, if necessary, in order to achieve optimum result. After that, these methods can be adapted by a teacher or a group of professors. Final recommendation is the creation of a continuous, closed loop feedback procedure according which the new digital product will be implemented, evaluated, corrected and reimplemented again. After the optimization the learning outcome, the new digital method will be able to join the university curriculum. Attention should be given to the way of evaluation and qualification. Any new digital method to be implemented should follow the coherent quality standards of each HEI and country legislation standards.

Digital innovation strategies focus mostly on meso level and they differ from country to country according to their national policies and strategies which reflect their perspective in digital development [12]. There are differences among public and collective institutions, accreditation system in each country and to technology providers. According to ECOLHE findings, some of the partner countries with the highest (DESI) are ahead form others, but during COVID-19 years all HEIs faced difficulties caused by the rapid transformation from face-to-face learning to online. Common ground in all universities was the organizational problems that they faced during their fully online operation.
Regarding the ***pandemic impact***, ECOLHE findings reveal that before the integration of any digital development, institutes should have a specific digital plan and the infrastructure to support it. To be more specific:

- They could pay attention to their network capacity and speed to cope with high demand operation conditions. At the beginning of the pandemic, network operation was problematic, as it was not designed to support the large number of students and staff.
- Learning platforms is another factor that attention should be paid to. During remote lessons, a lot of different video conference platforms were used and, according to the users perspective some of them was better than others. A very careful selection of the e-learning platform is essential.
- One learning platform could be used globally for all HEIs procedures. Using different platforms will lead to confusion because, in that way, users should had to learn and work in different interfaces.

- Properly design teaching-learning procedures for use in remote environment. Remote lessons have different approaches and needs in comparison with face-to-face ones. It is not a good practice to copy a traditional teaching method to a digital environment because, as the pandemic revealed, it is very hard for teachers to teach in a screen for approximately three hours, and for students to be focused. SLP will be a very useful guide in a proper design and could be used to.
- Digital tools and gamification methods would be useful if integrated in teaching-learning procedures to attract students' attention and enhance learning outcomes.
- Proper design of examination and evaluation procedures aiming to reduce cheating and plagiarism should also be dealt with.

Quality standards are adopted at national level and the quality assurance is built by academic institutions at local level. Each institution sets its own parameters concerning the outcomes of its operation. Quality of studies and administrative procedures consist of a major factor of HEIs reputation. A good practice used in most of HEIs is a central ***Quality Assurance Unit (QAU)*** with the responsibility for the coordination and support of the whole process of institutions' quality assurance system.

HEIs should pay extra attention in the introduction of new standards referring to digital environments' qualification. It is suggested to focus to:

- Ensure that studies will have the same or even better results for their graduates.
- Apply examination procedures in digital environments immutable and fair for all the participants.
- Digital transformation that will not reduce institutes' reputation.
- Digital teaching that will not lead to degrees downgrade.
- Digital administration that will perform as good as traditional and in many cases even better.

To achieve all the above first an open dialogue with all key players within the institutions should be held to define the lower limit of quality that should be maintained. Second, it is proposed the formation of a complementary committee in every institution with the scope of continuously monitoring and evaluating digital procedures and outcomes. This is suggested to be representative, consisting of all actors in the formation of the committee, professors, tutors, administrative staff and students. An external evaluator opinion might also be helpful and be encouraged with the purpose of a clear point of view evaluation.

The formation of a QA point system is also recommended to take into consideration:

- Administrative operation and performance.
- Teaching procedures.
- Teaching staff performance.
- Students' learning experience.
- Students' learning outcomes.
- Students' performance.
- Graduates' employability.
- Connection of learning outcomes with market needs.

Indexes could be measured for any of these points by the online system and/or questionnaires and be continuously monitoring, presenting HEI current state.

ii. Recommendations regarding digital technologies in HEIs

Taking into consideration students' opinions and needs regarding the improvement of digital technologies in HE, it is suggested that HEIs implement the following:

- A periodically survey internally in every department on the HEI, exploring the digital maturity of students, teaching and administrative staff.
- Using the results from each department a general digital maturity outcome will be extracted for the whole institution.

- Determine an institutional digital maturity factor which will be a quantitative quality variable that every HEI will try to optimize.
- Organization of workshops and conferences with the subject the digitalization of HEIs. Here the vision of EU digital transformation in HE will be analyzed in detail with respect to each institution internal rules.
- Organization of internal HEIs surveys for the exploration of students' current state in digitalization.
- Creation of digital learning environments and platforms.
- Team working encouragement in digital learning environments with the scope that high digital tunned students help the less ones.
- An open dialogue with market stakeholders to take place.
- Organization of seminars for students' information about employability possibilities.
- Organization of workshops focusing on market needs.
- Reformation of curriculum enhancing new teaching tools.
- Use of new teaching methods and tools in lectures.
- Using new innovative methods in curriculum design (e.g. Symbiotic Learning Paradigm SLP) [11]
- The organization of seminars promoting career opportunities.
- Use of asynchronous learning methods
- Encourage the use of digital tools in learning procedures.
- Promote an open dialog among students in class.
- Use of online training models to increase teachers' digital capacity.
- Peer to peer projects assignment.
- Use of gamification teaching methods.

iii. Recommendations regarding Online Training model for improving teachers in HE

Taking into consideration the analysis carried out in [9], regarding the use of online training models, HEIs could:

- Ensure previous knowledge on some competences before participants enrolment in an online training. Collaborative work and asynchronous communication are two key competences to ensure success in an online training and both require the active role of the participants.
- Ensure that all involving parts (facilitators and learners) have knowledge of the platform where the course will be based and its accessibility for both teachers and learners. Therefore, a pre-training is needed for the participants, and another one addressed to the e-facilitators to offer all the background necessary to go deep in online teaching-learning.
- Regardless of the tasks that each course activity proposes, it is also important that activities that participants have already created or used in their day-to-day courses can be integrated or adapted.
- Incorporate in the planification of training some synchronous sessions to check if there are any aspects to improve or clarify.

iv. Recommendations regarding the adoption of Gamification in HE

In [9], ECOLHE project investigates the use of educational gamification tools in HE, which can be defined as the use of game elements, and game design techniques in educational contexts. During the Pilot Training carried out as part of the ECOLHE project, participants were presented with a survey including a list of possible benefits of Gamification to rate, as well as the opportunity to add their own. Advantages and disadvantages of gamification methods are analyzed in [10] and general recommendations considering their use are:

- The creation of an interdisciplinary approach or team.
- Good collaboration with teachers that already implemented Gamification in their classes. In this way, newcomers of Gamification would not have to start from scratch but have a good starting point on how it should be implemented and adapt it to their courses.
- Continues update with new tools, apps and resources that would be useful in a Gamified class.

- Efficient use of plugins and software to create content in order to save time and solve the disadvantage.
- Allocation of the resources and creation of interdisciplinary collaborative working contexts with moderators. There are instructional designers who are experts, and this is their subject-matter area, so hiring them for teams that provide online and blended options would be vital for professional provision.
- Make some processes more automated and give teachers templates to refer to.
- Provide teachers with adequate documentation and support, especially during their first experience with Gamification.
- The use of practical experiments for the development of students in the professional activity that they will later develop and where they will apply what they have learned.
- Include practical experiences so they can transfer their theoretical learning to practice. It is important to ensure that gamification is not just a digital experience, it must also promote subject competencies.
- The clarification that gamification use should be a tool for continuous improvement but not the reality of everyday life.
- It should be gradually introduced into the teaching programmes and be combined with other tools.
- Use of a questionnaire at the beginning of the course to see the level of knowledge of the students and adapt the difficulty of the game and keep them in mind in the design of the gamification.
- Adapting to the needs of the students, additional learning resources can be offered that allow the student to reach the resolution of the gamified activity.
- Evaluation of the gamified activities should be adapted to the needs of the students and be based on an evaluation system for the improvement of their learning, considering the starting point and what they have accomplished when completing the game.
- Teachers should use Gamification as students, to learn how to improve and get help from other teachers. Create content in different formats (audio, video and tactile), and give the students the chance to participate in some aspects of Gamification in anonymity and use scores in order to encourage participation.
- Elimination of leader board or thinking about a different one.
- Add additional study units based on the mistakes the student makes.

VI. CONCLUSION

Digital transformation in HE leads institutions' primary operations to be performed in a different way. The adoption of new methods and technologies seems like a one-way street for the operation of HEIs in the following years.

ECOLHE Project, taking into account the accumulative experience of the participating universities in five European countries with varying education field and digital innovation maturity, lead to the formation of a set of guidelines. Development topics (clusters) were extracted, latent factors were revealed, characterizing students' digital maturity, factors increasing digital impact were determined, gamification ideas were explored and a learning paradigm for innovating course design was implemented. The guidelines resulting from this analysis can be used as a roadmap for the successful modernization of the education process based on the smooth integration of digital methods in existing education programs.

REFERENCES

[1] European Commission. “Digital Education Action Plan (2021-2027)”
[2] Christopher Brooks C., McCormack M., “Driving Digital Transformation in Higher Education”, EDUCAUSE report, 2020
[3] Deaconu S, Olah R., Haj C., “Assessing Students’ Perspective on Teaching and Learning. The Case of National Students’ Surveys”, https://doi.org/10.1007/978-3-030-56316-5_22
[4] Gaebel M., Zhang T., Iucu R, “Advancing Learning and Teaching in the EHEA: Innovation and Links with
Research”, https://doi.org/10.1007/978-3-030-56316-5_18
[5] Rathod P. , Kämppi P., “Digital transformation and digital pedagogy quality of learning and teaching in HE”, ECOLHE report, 2023
[6] Cecchini G., Proietti E., “Digital Transformation in the European Higher Education Area. Between constraints and opportunities, organisational transformation and innovation”, ECOLHE report, 2022.
[7] Capogna S, Cocozza A, Cecchini G., De Angelis M. C, De Gennaro G., Delli Poggi B., Fonzo C., Proietti E., “ Digital Technologies in HE: from the European vision to the university governance”, ECOLHE report, 2021.
[8] Greco F., Musella F., Botte B., De Angelis M. C, Marinensi G., “Comparative Research Report on “Digital Technologies in HE: from the European vision to the university governance”, ECOLHE report, 2022.
[9] Guitert M., Romeu T., Romero M., Baztán P., “Online Training Model for Improving Teachers in HE: Challenges, Criticalities, Possibilities”, ECOLHE report, 2022.
[10] Marinensi G., Lallo M., Botte B., “Gamification as a strategy to increase student engagement in HE: Teachers’ Perspective”, ECOLHE report, 2023.
[11] McCarthy F, Ó Tuama S. “The Symbiotic Learning Paradigm (SLP): Teacher Competencies, Methods & Approaches in Higher Education”, ECOLHE report, 2023.
[12] Capogna S., De Angelis M. C, Greco F., “Comparative analysis of national reports: the case of the Erasmus+ ECOLHE Project”, ECOLHE report, 2022.

ADOPTING GAMIFICATION AS A STRATEGY TO SUPPORT STUDENTS' MOTIVATION IN HIGHER EDUCATION:

THE TEACHERS' ROLE

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ABSTRACT

Students' academic performance and learning outcomes are significantly influenced by their level of engagement in learning activities and their motivation to learn. Several studies referred to gamification as a possible strategy to foster students' engagement and motivation at the Higher Education (HE) level. However, a crucial factor affecting the adoption and the success of this new pedagogical practice is the fact that teachers possess the needed skills' set to implement it. To equip teachers with the competences needed to effectively design, implement, and evaluate a gamified learning activity, an online course was prepared and piloted in the framework of the European project ECOLHE. This work will offer an analysis of the course design process and a synthesis of the course implementation results.

Keywords: Gamification, Higher Education, students' engagement, teachers' training, teachers' attitude

INTRODUCTION

Engagement and motivation are vital factors in higher education, as they directly influence students' academic performance and overall learning outcomes (Davis & McPartland, 2012; Finn & Zimmer, 2012; Liu, Bridgeman, & Adler, 2012; Trowler, 2010). Actively engaged and motivated students are more likely to participate in class, complete assignments on time, collaborate with peers, and seek a deeper understanding of the subject matter. Such students tend to exhibit higher levels of critical thinking, creativity, and problem-solving skills, fostering an enriching educational environment (Fredricks, Blumenfeld, & Paris, 2007; Trowler, 2010).

Despite recognizing the significance of student engagement and motivation, HEIs often encounter challenges in effectively achieving and maintaining desired levels (Kahu, 2013; Thomas, 2012; Trowler, 2010). Factors such as passive teaching methodologies, disconnection between theoretical concepts and real-world applications, and limited personalisation of learning experiences contribute to decreased students' engagement and motivation (Schnitzler, Holzberger, & Seidel, 2020). Recognizing these struggles, HEIs are actively seeking innovative approaches to enhance students' learning experience.

Gamification presents a promising solution to address the challenge of student engagement and motivation. By incorporating game elements, such as challenges, rewards, and progress tracking, into the learning process, gamification transforms the educational experience into an interactive and immersive journey. Numerous studies have reported positive outcomes of educational gamification, including increased student engagement, motivation, knowledge retention, and overall satisfaction with the learning process (Kovácsné Pusztai, 2021; Metwally, Nacke, Chang, Wang, & Yousef, 2021; Subhash & Cudney, 2018; Wu, Zhou, & Li, 2023).

Even in the light of its potential benefits, the adoption of gamification in higher education faces certain barriers. One significant obstacle is teachers' attitudes and knowledge about gamification. Some educators may be hesitant to implement gamified approaches due to unfamiliarity, concerns about time constraints, or doubts about its effectiveness. Moreover, limited exposure to gamification during their own education may contribute to teachers' reservations and lack of confidence in employing such strategies. Therefore, to enhance teachers' attitudes and knowledge about gamification, several steps can be taken. First and foremost, professional development programs and workshops can be conducted to introduce teachers to gamified learning approaches, provide hands-on experience, and showcase successful case studies (Lester et al., 2023; Sajinčič, Sandak, & Istenič, 2022; Santos-Villalba, Olivencia, Navas-Parejo, & Benítez-Márquez, 2020; Toda, Valle, & Isotani, 2018; Wu et al., 2023).

With the aim of contributing to the advancement of higher education teachers' knowledge and skills in gamification, six European universities (Laurea, Finland; LCU, Italy; UCC, Ireland; Roma Tre, Italy; UOC, Spain; UPatras, Greece), all partners of the Erasmus+ project ECOLHE, jointly designed, implemented and evaluated an online training program. The results of the pilot implementation of this program will be discussed in this paper.

LITERATURE REVIEW

Adoption and effectiveness of gamified learning in Higher Education

Gamified learning in higher education, also known as educational gamification, gamification in education, or gamification for educational purposes, has been the subject of various definitions and conceptualizations. Landers (2014) defines gamified learning as the use of game elements to facilitate learning and related outcomes, including action language, assessment, conflict/challenge, control, environment, game fiction, human interaction, immersion, and rules/goals. He emphasises that educational gamification must successfully modify learner behaviour or attitude toward learning. In contrast, serious games differ from gamification as they directly provide instructional content, while gamification supports existing instructional content. Dichev & Dicheva (2017) share a similar perspective, stating that gamification in education involves introducing game design elements and game-like experiences into learning processes. They highlight the transformational aspect of gamification, making the learning process more game-like. Other scholars, such as Tulloch (2014) and Songer & Miyata (2014), view educational gamification as a pedagogic framework that integrates entertainment, engagement, and playful experiences to enhance learners' intrinsic motivation.

Educational gamification has gained significant attention in research, especially in higher education. A literature review by Manzano-León et al. (2021) revealed a substantial increase in experimental articles on educational gamification between 2016 and 2019. This rise in interest can be attributed, in part, to the changing expectations and characteristics of the current generation of university students. Millennials and Generation Z, who form the majority of university students, are technologically adept and familiar with video games, making them receptive to gamified approaches. Research indicates that university students generally have a positive attitude towards gamification in education, as it makes lectures more interesting and improves the learning environment (Alabbasi, 2017; Cheong, Filippou, & Cheong, 2014).

Numerous empirical studies have explored the effectiveness of gamification in educational settings, particularly in terms of its impact on motivating and engaging learners (some of the most recent ones include: (Campillo-Ferrer, Miralles-Martínez, & Sánchez-Ibáñez, 2020; Huang et al., 2020; Kovácsné Pusztai, 2021; Tsay, Kofinas, & Luo, 2018; Wu et al., 2023)). Some studies have highlighted several positive effects of gamified learning in higher education, including improved student performance, increased engagement and motivation, better attitudes toward learning, overall enjoyment of the learning process, and even higher quality of work (Antonaci, Klemke, & Specht, 2019; Caporarello, Magni, & Pennarola, 2019; Dreimane, 2019; Zainuddin, Chu, Shujahat, & Perera, 2020).

On the other hand, negative effects of educational gamification should not be overlooked. Some studies have found that gamification may lead to loss of performance, undesired behaviour, and declining

effects on learners (Toda et al., 2018). The overjustification effect (Deci, Ryan, & Koestner, 1999) has also been observed, where the provision of extrinsic rewards diminishes intrinsic motivation to learn (Hanus & Fox, 2015). Moreover, it needs to be taken into account the fact that not all students respond in the same way to gamification, and individual differences such as learning styles, personality traits, and player types can influence the efficacy of gamified interventions (Buckley & Doyle, 2017; Domínguez et al., 2013).

Although it cannot explain all the negative effects reported in the literature, it can be pointed out that the poor design of the gamified intervention is often cited by scholars as the cause of negative or neutral results. Indeed, the simple integration of points, badges and rankings into a learning content or process, often referred to as PBL gamification or even 'pointification' of learning, is a frequent but superficial implementation of educational gamification, which is often reported as having no effect or even being detrimental (Domínguez et al., 2013).

However, due to the inherent multi-disciplinary nature of gamification, the design and implementation of a gamified learning intervention may require a wide range of knowledge and skills, ranging from psychology to education, from game design to interaction design, as well as, of course, specific knowledge related to the disciplinary field in which gamification is to be implemented. A wealth of knowledge and skills that a teacher does not necessarily possess, increasing the barriers and difficulties to experimenting with this approach.

Barriers to the adoption of gamified learning at the HE level

Currently, only a small fraction of university teachers incorporates gamification or game-based learning in their teaching. Various studies have identified the drivers and barriers influencing teachers' adoption of gamification. Teachers are motivated by expectations of increased student interactions, collaborative learning, higher engagement, enjoyment, and motivation (Lester et al., 2023; Sánchez-Mena & Martí-Parreño, 2017). Conversely, barriers include a lack of time to develop gamified approaches, insufficient evidence of benefits, challenges in managing classroom dynamics, and financial constraints (Sánchez-Mena & Martí-Parreño, 2017).

When asked to reflect on the most relevant advantages and disadvantages of gamified learning, HE teachers, researchers and doctoral students involved in the ECOLHE project (n=44) showed an overall positive attitude towards gamification, while still expressing several concerns about its effectiveness and possible risks of implementing it (Marinensi, Di Lallo, & Botte, 2023). They were given a list of predefined advantages and disadvantages of gamification in education and were asked to rate these factors on a five-point Likert scale. The results showed that participants generally agreed on the advantages of gamification (Figure 1), such as improving knowledge absorption and retention, fostering motivation and engagement, providing immediate feedback, applying learning in meaningful contexts, and promoting cooperation and teamwork.

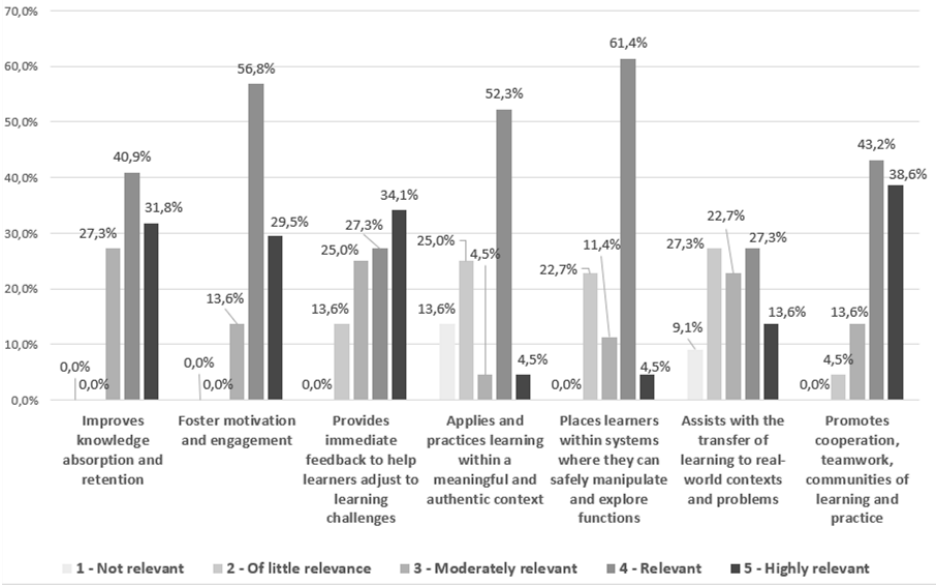

Figure 1. Advantages of gamification

However, there were varied opinions on some disadvantages (Fig. 2), such as distraction from learning objectives, overstimulation or game addiction, replacement of other learning activities, meeting the needs of all learners, blurring boundaries between virtuality and reality, and consuming teaching resources and time. Some participants also provided additional insights and concerns about gamification, including its impact on stress levels, the need for digital competencies, availability of IT equipment, and adapting to different student motivations.

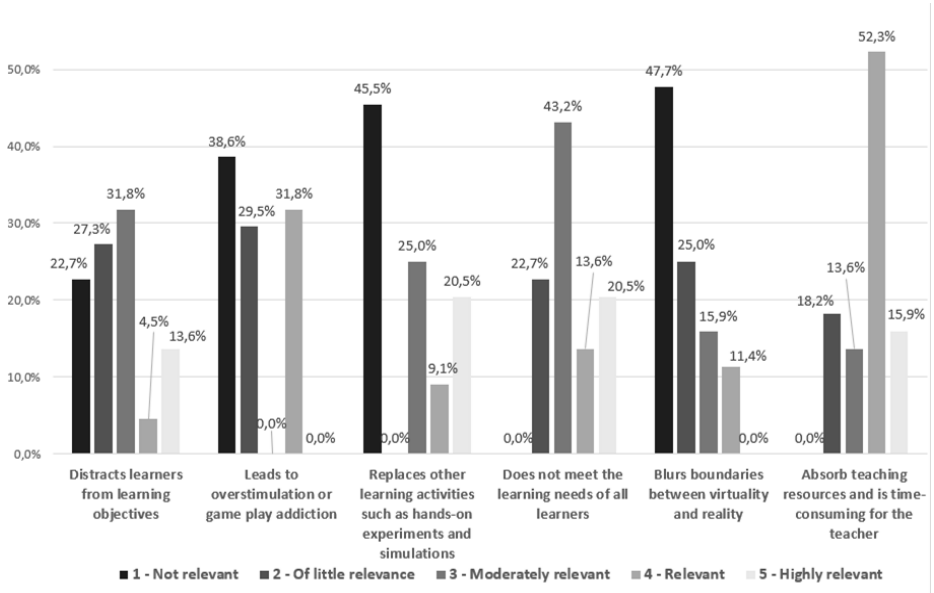

Figure 2. Disadvantages of gamification

The importance of teachers' training

Providing teachers with proper training, guidance, and support during the design and implementation stages of gamified learning interventions can bridge the existing gap between the overall teachers' attitude toward gamification and its actual use in their teaching practice (Santos-Villalba et al., 2020). In light of existing literature on this subject (Sajinčič et al., 2022; Santos-Villalba et al., 2020; Wu et al.,

2023), is possible to affirm that offering HE teachers' adequate training about gamification could also be a key factor affecting the effectiveness of gamification for several reasons:

- Creating the conditions for proper implementation: teachers who receive training in gamification are better equipped to understand the principles and strategies involved in effectively incorporating game elements into their teaching practices.
- Fostering pedagogical knowledge: training allows teachers to gain a deeper understanding of how gamification can be integrated into the curriculum and instructional design.
- Addressing challenges: gamification in education presents challenges that teachers need to be prepared for. Teachers who are aware of these challenges can make informed decisions and adjustments to optimise the effectiveness of gamification.
- Encouraging the adaptation to student needs: training empowers teachers to adapt gamification approaches to the diverse needs of their students. They can consider factors such as students' learning styles, preferences, and individual differences when designing gamified experiences.
- Fostering continuous improvement: training provides teachers with the knowledge and skills to evaluate the effectiveness of gamified interventions. Continuous professional development ensures that teachers stay up to date with new research and best practices in gamification, allowing them to continually enhance their instructional approaches.

Additionally, involving a group of teachers in training initiatives can build the basis for creating a community of educators with different degrees of experience in educational gamification, which can contribute by developing resources and sharing experiences to the adoption of appropriate gamified approaches.

THE ECOLHE PILOT TRAINING

Course design

One of its key outputs of the ECOLHE project, funded by the European Commission under the Erasmus+ framework, involved the development and implementation of a training program designed for teachers in order to enhance online teaching in higher education. This initiative aligns with the principles of lifelong learning, inclusivity, and innovation as emphasised by the High-Level Group on the Modernization of Higher Education (European Commission, 2013).

To evaluate the efficacy of the training program, a pilot phase was incorporated, testing also the digital platform, guidelines, and tools developed specifically for training higher education teachers. The pilot program aimed to bring about a transformation among stakeholders by introducing a training model that effectively harnesses ICT and digital environments in the context of higher education. Additionally, it sought to provide an innovative training model that could be replicated by other higher education institutions, thus promoting online teaching and essential teaching competences in the digital era.

The training program consisted of two modules, each with a distinct focus: (1) the module 1 was about online teaching and learning; while the (2) module 2 was about gamified learning. In this paper we'll focus on the second module, which was divided into 4 learning activities. In the first one, participants were introduced to the basic theoretical background of educational gamification and main characteristics. Then they must analyse some international case studies and, working in small groups, reflect on the main advantages and disadvantages of gamified learning in Higher Education. During the second activity basic educational gamification design principles were presented to the participants, along with an overview of the tools most used to implement gamified learning at the Higher Education level. Working in small groups, participants had to design and develop a self-assessment learning activity using the tool Kahoot!. Moving on, participants were asked to propose their plan for the implementation of a gamified learning activity in an Higher Education course. They were specifically encouraged to reflect on the obstacles they could face, when implementing gamification in a course, and to propose strategies to overcome them. Finally, in the last activity, participants had the chance to self-evaluate their work and afterward to look at the work of other groups and provide them with feedback and suggestions to improve it.

The participants

The pilot training program was designed to cater to a diverse group of individuals, including university teachers, tutors, doctoral and postdoctoral students, as well as researchers who were interested in enhancing their teaching practices in online settings, all of them being members of the Universities partners of the ECOLHE project: University of Patras (UPAT) - Greece; Universitat Oberta de Catalunya (UOC) - Spain; University of Applied Sciences (LAUREA) - Finland; University College Cork (UCC) - Ireland; Link Campus University (LCU) - Italy; Università degli Studi Roma Tre (Roma Tre) - Italy. Overall, a total of 128 participants enrolled in the pilot training program across all partner countries. Out of the total 128 participants who enrolled across all partner countries, only 40 successfully completed the pilot training course. Among the participants who completed the course, 34 were university teachers, 1 was a doctoral/postdoctoral student, 1 was a researcher, and 4 belonged to other categories. The participants in the pilot training program comprised individuals of various genders, with a majority being women.

Pilot training implementation

The pilot training was conducted online and spanned a duration of three months, specifically from March 2022 to May 2022. It was structured in two webinars and four learning activities as summarised in the following table (Table 1).

Table 1. Structure of the training

ACTIVITY	AIM	WORKLOAD
WEBINAR introduction	Introduction to the training	2h
ACTIVITY 1	Analysis of different gamified learning experiences carried out at the HE level	4h
ACTIVITY 2	Design of a self-assessment gamified learning activity (using the tool Kahoot!)	10h
ACTIVITY 3	Strategies to effectively implement gamified learning in HE courses	8h
ACTIVITY 4	Gamified learning activities evaluation	4h
WEBINAR conclusion	Conclusion and training evaluation	2h
	Total	**30h**

Feedback from the participants

The final synchronous webinar had the specific purpose to assess the pilot training and gather feedback from the participants regarding their experiences. During this session, e-facilitators encouraged the participants to provide a brief presentation on the outcomes of their activities. In addition to the webinar, the evaluation process included a final questionnaire designed to measure the participants' progression in digital competences and gamification throughout the training.

A first feedback on the gamification aspects of the training was given by the participants from UPAT (EL) with two different points of view between experienced teachers and younger PhD students. In general, they all had some familiarity with these methods, but only a small number actually incorporated them in the classroom. While they didn't hold negative views towards gamification, they believed it played a minor role in the teaching process. Teachers generally lacked familiarity with gamification platforms like Kahoot, whereas PhD students appeared to be more knowledgeable and utilised them to some extent.

Despite this, the overall impression regarding the use of gamification methods was not negative. Age is probably a significant factor contributing to the discomfort felt by some participating teachers, as they

may be hesitant to change their teaching methods after many years. Conversely, PhD students expressed the belief that these methods should play a major role in future teaching procedures.

It should be noted that the belief that gamification has no relevance in the teaching process may be due to a lack of knowledge about what the theoretical and practical basis is for its best use. In this sense, teacher education and training plays a primary role in the effectiveness of this methodology.

UOC (ES) participants already had a large experience as online education professionals, so the proposed gamification has not been an added challenge for them. They observed that introducing Kahoot is very useful as a self-assessment tool, but it needs more integration in the global design of the training. Knowledge of new tools for online teaching or new uses of already known tools was highly valued as well.

Most participants from UCC (IE) had no prior experience with gamification, and this aspect of the pilot received positive feedback. Using Kahoot! for social science content proved to be a challenge that needed a little support from the facilitators to overcome.

The main problem was that many groups took on the ambitious task of incorporating a new digital tool for online teaching, which resulted in limited time dedicated to the gamification component of the course. This led to some confusion as they questioned the relevance of designing a Kahoot! activity that they were unlikely to use, given their focus on integrating a digital tool into their teaching practice. It would have been clearer for them if the gamification course had followed directly after the online teaching portion, allowing them to give it the attention it deserved. This would have aligned with their desire to explore and fully engage with the topic, especially because gamification was new for most of the participants and so it would have been better if it were presented to them in isolation and after completing the online teaching course.

Overall, participants acknowledged the relevance of the course topics and expressed the need for further training in these areas, even within the context of traditional universities. They particularly appreciated the course content being based on recent research papers and the effective presentation within the course workspace. The potential of gamification was recognized as offering new possibilities, although it also presented challenges when seeking practical solutions, particularly when students strongly adhered to traditional teaching methodologies. This concept was also underlined by participants from Roma Tre (IT) and Laurea (FI).

For the participant from Roma Tre (IT) the recommended online learning game resource, Kahoot!, proved to be quite limited as its full functionality required a paid subscription. Due to this limitation, the resource couldn't be fully leveraged for effective learning purposes.

The overall feedback from most of the participants was of acceptance and desire to deepen their knowledge of the gamification methodology, with some doubts about the possible practical challenges that it may bring and some resistance to adopt something new and change their well-known teaching methods. It is worth noting that the entire training, including the part on gamification, was greatly affected by the participants' lack of time particularly in terms of the commitment required in certain tasks. This factor was also decisive with regard to the acquisition and absorption of basic knowledge related to gamification, a key factor for its proper understanding and implementation. In addition to this, another element that definitely influenced participants' attendance and preparation was the difficulty on some occasions in understanding what was required of them, making it even more time-consuming to complete them. These two factors combined definitely made it more difficult to understand and how to apply in practice the concepts that were being explained during the training especially with regard to gamification, which in some cases remained a residual topic of the course.

These considerations should lay the foundation for building future trainings that target gamification in teacher education.

CONCLUSION

Gamification, with its integration of game elements and mechanics into educational settings, has emerged as a compelling approach to captivate and motivate students. Recognising its potential, the Erasmus+ project ECOLHE aimed to equip higher education teachers with the necessary knowledge and skills to effectively employ gamification in their teaching practices. Therefore, the six European universities participating in the ECOLHE consortium designed and developed an online training module focused on gamification fundamental concepts, practical implementation strategies, and assessment techniques tailored specifically for higher education contexts. Through a combination of instructional modules, interactive activities, and real-life examples, the program aimed to provide teachers with a solid foundation in gamification principles and empower them to apply these principles in their own classrooms. Alongside the online training program, the ECOLHE project emphasised the importance of establishing communities of practice, which can provide a platform for teachers to collaborate, share experiences, and exchange best practices related to gamification. By fostering interaction and knowledge exchange among educators, the ECOLHE project aimed to create a supportive network that further enriched teachers' understanding and implementation of gamification in higher education.

The pilot implementation of the online training program yielded encouraging results. Participant feedback highlighted the program's effectiveness in enhancing teachers' knowledge, confidence, and skills in implementing gamification. They also shared constructive feedback on how to improve the training. They suggested that it would have been clearer and more effective if the gamification module followed directly after the online teaching one, allowing them to give it the attention it deserved. Some participants mentioned that they faced challenges in understanding what was required of them, which made it more time-consuming to complete tasks. Clearer instructions would have facilitated their understanding and application of the concepts being taught, especially regarding gamification. Finally, Participants recognised the potential of gamification but mentioned the need for practical solutions and examples of its implementation. Providing more practical guidance and examples would help participants overcome potential challenges and better apply gamification techniques in their teaching practices.

These considerations, albeit derived from a limited pilot experience, hold potential value in informing the development of future training programs that specifically address the integration of gamification within teacher education.

REFERENCES

Alabbasi, D. (2017). Exploring Graduate Students' Perspectives towards Using Gamification Techniques in Online Learning. *Turkish Online Journal of Distance Education*, *18*(3), 180–180. https://doi.org/10.17718/tojde.328951

Antonaci, A., Klemke, R., & Specht, M. (2019). The Effects of Gamification in Online Learning Environments: A Systematic Literature Review. *Informatics*, *6*(3), 32. https://doi.org/10.3390/informatics6030032

Buckley, P., & Doyle, E. (2017). Individualising gamification: An investigation of the impact of learning styles and personality traits on the efficacy of gamification using a prediction market. *Computers & Education*, *106*, 43–55. https://doi.org/10.1016/j.compedu.2016.11.009

Campillo-Ferrer, J.-M., Miralles-Martínez, P., & Sánchez-Ibáñez, R. (2020). Gamification in Higher Education: Impact on Student Motivation and the Acquisition of Social and Civic Key Competencies. *Sustainability*, *12*(12), 4822. https://doi.org/10.3390/su12124822

Caporarello, L., Magni, M., & Pennarola, F. (2019). One Game Does not Fit All. Gamification and Learning: Overview and Future Directions. In *Lecture Notes in Information Systems and Organisation* (Vol. 27, pp. 179–188). Springer International Publishing. https://doi.org/10.1007/978-3-319-90500-6_14

Cheong, C., Filippou, J., & Cheong, F. (2014). Towards the gamification of learning: Investigating student perceptions of game elements. *Journal of Information Systems Education*, *25*(3), 233–244.

Davis, M. H., & McPartland, J. M. (2012). High school reform and student engagement. In *Handbook of Research on Student Engagement*. https://doi.org/10.1007/978-1-4614-2018-7_25

Deci, E. L., Ryan, R. M., & Koestner, R. (1999). A meta-analytic review of experiments examining the effects of extrinsic rewards on intrinsic motivation. *Psychological Bulletin*, *125*(6), 627–668. https://doi.org/10.1037/0033-2909.125.6.627

Dichev, C., & Dicheva, D. (2017). Gamifying education: what is known, what is believed and what remains uncertain: a critical review. *International Journal of Educational Technology in Higher Education*, *14*(1), 9. https://doi.org/10.1186/s41239-017-0042-5

Domínguez, A., Saenz-de-Navarrete, J., De-Marcos, L., Fernández-Sanz, L., Pagés, C., & Martínez-Herráiz, J.-J. (2013). Gamifying learning experiences: Practical implications and outcomes. *Computers & Education*, *63*, 380–392. https://doi.org/10.1016/j.compedu.2012.12.020

Dreimane, S. (2019). Gamification for Education: Review of Current Publications. In L. Daniela (Ed.), *Didactics of Smart Pedagogy* (pp. 453–464). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-030-01551-0_23

Finn, J. D., & Zimmer, K. S. (2012). Student engagement: What is it? Why does it matter? In *Handbook of research on student engagement* (pp. 97–131). Springer.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2007). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*. https://doi.org/10.3102/00346543074001059

Hanus, M. D., & Fox, J. (2015). Assessing the effects of gamification in the classroom: A longitudinal study on intrinsic motivation, social comparison, satisfaction, effort, and academic performance. *Computers & Education*, *80*, 152–161. https://doi.org/10.1016/j.compedu.2014.08.019

Huang, R., Ritzhaupt, A. D., Sommer, M., Zhu, J., Stephen, A., Valle, N., … Li, J. (2020). The impact of gamification in educational settings on student learning outcomes: a meta-analysis. *Educational Technology Research and Development*, *68*(4), 1875–1901. https://doi.org/10.1007/S11423-020-09807-Z/FIGURES/5

Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education*, *38*(5), 758–773. https://doi.org/10.1080/03075079.2011.598505

Kovácsné Pusztai, K. (2021). Gamification in Higher Education. *Teaching Mathematics and Computer Science*, *18*(2), 87–106. https://doi.org/10.5485/TMCS.2020.0510

Landers, R. N. (2014). Developing a Theory of Gamified Learning. *Simulation & Gaming*, *45*(6), 752–768. https://doi.org/10.1177/1046878114563660

Lester, D., Skulmoski, G. J., Fisher, D. P., Mehrotra, V., Lim, I., Lang, A., & Keogh, J. W. L. (2023). Drivers and barriers to the utilisation of gamification and game-based learning in universities: A systematic review of educators' perspectives. *British Journal of Educational Technology*, (February), 1–23. https://doi.org/10.1111/bjet.13311

Liu, O. L., Bridgeman, B., & Adler, R. M. (2012). Measuring Learning Outcomes in Higher Education: Motivation Matters. *Educational Researcher*. https://doi.org/10.3102/0013189X12459679

Manzano-León, A., Camacho-Lazarraga, P., Guerrero, M. A., Guerrero-Puerta, L., Aguilar-Parra, J. M., Trigueros, R., & Alias, A. (2021). Between Level Up and Game Over: A Systematic Literature Review of Gamification in Education. *Sustainability*, *13*(4), 2247. https://doi.org/10.3390/su13042247

Marinensi, G., Di Lallo, M., & Botte, B. (2023). Gamification as a strategy to increase student engagement in Higher Education: exploring teachers' perspective. In S. Capogna, G. Makrides, & V. Stylianakis (Eds.), *The European Higher Education Area facing the Digital Challenge*.

Metwally, A. H. S., Nacke, L. E., Chang, M., Wang, Y., & Yousef, A. M. F. (2021). Revealing the hotspots of educational gamification: An umbrella review. *International Journal of Educational Research*, *109*, 101832. https://doi.org/10.1016/j.ijer.2021.101832

Sajinčič, N., Sandak, A., & Istenič, A. (2022). Pre-Service and In-Service Teachers' Views on Gamification. *International Journal of Emerging Technologies in Learning*, *17*(3), 83–103. https://doi.org/10.3991/ijet.v17i03.26761

Sánchez-Mena, A., & Martí-Parreño, J. (2017). Drivers and barriers to adopting gamification: Teachers' perspectives. *Electronic Journal of E-Learning*, *15*(5), 434–443.

Santos-Villalba, M. J., Olivencia, J. J. L., Navas-Parejo, M. R., & Benítez-Márquez, M. D. (2020). Higher education students' assessments towards gamification and sustainability: A case study. *Sustainability (Switzerland)*, *12*(20), 1–20. https://doi.org/10.3390/su12208513

Schnitzler, K., Holzberger, D., & Seidel, T. (2020). All better than being disengaged: Student engagement patterns and their relations to academic self-concept and achievement. *European Journal of Psychology of Education*. https://doi.org/10.1007/s10212-020-00500-6

Songer, R. W., & Miyata, K. (2014). A playful affordances model for gameful learning. *ACM International Conference Proceeding Series*, 205–213. https://doi.org/10.1145/2669711.2669901

Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. *Computers in Human Behavior*, *87*(February), 192–206. https://doi.org/10.1016/j.chb.2018.05.028

Thomas, L. (2012). Building Student Engagement And Belonging In Higher Education At A Time Of Change. *What Works? Student Retention & Success*, (March 2012), 16. Retrieved from http://www-new2.heacademy.ac.uk/assets/documents/what-works-student-retention/What_works_final_report.pdf

Toda, A. M., Valle, P. H. D., & Isotani, S. (2018). *The dark side of gamification: An overview of negative effects of gamification in education*. *832*(August). https://doi.org/10.1007/978-3-319-97934-2

Trowler, V. (2010). Student engagement literature review. In *The Higher Education Academy*. https://doi.org/10.1037/0022-0663.85.4.571

Tsay, C. H.-H., Kofinas, A., & Luo, J. (2018). Enhancing student learning experience with technology-mediated gamification: An empirical study. *Computers & Education*, *121*(January), 1–17. https://doi.org/10.1016/j.compedu.2018.01.009

Tulloch, R. (2014). Reconceptualising gamification: Play and pedagogy. *DIGITAL CULTURE & EDUCATION*, *6*(4), 317–333. Retrieved from http://www.digitalcultureandeducation.com/URL:http://www.digitalcultureandeducation.com/cms/wp-content/uploads/2014/12/tulloch.pdf

Wu, M. L., Zhou, Y., & Li, L. (2023). The effects of a gamified online course on pre-service teachers' confidence, intention, and motivation in integrating technology into teaching. *Education and Information Technologies*, (0123456789). https://doi.org/10.1007/s10639-023-11727-3

Zainuddin, Z., Chu, S. K. W., Shujahat, M., & Perera, C. J. (2020). The impact of gamification on learning and instruction: A systematic review of empirical evidence. *Educational Research Review*, *30*(March), 100326. https://doi.org/https://doi.org/10.1016/j.edurev.2020.100326

A STUDENT-CENTRIC WORKING-LIFE COMPETENCE DEVELOPMENT A JOURNEY FROM CLASSROOM TEACHING TOWARDS 'ONLIFE' LEARNING: PEDAGOGICAL BEST PRACTICES

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ABSTRACT

In recent years the digital transformation and pandemic emergency demanded the digitalisation of contemporary higher education (HEIs) in Europe. The situation needs transformational vision, legislative and operational support from the HEI stakeholders, government, and relevant bodies. However, the most critical element is a working-life, and the industry demands a new set of skills and competencies from HEIs graduates. The ECOLHE European innovation project presented the Onlife Manifesto for being human in the hyperconnected world. More broadly, it helps start a reflection on how a hyperconnected world calls for rethinking the many existing practices in HEIs. On the one hand, the hyperconnected world demands a new way of future competencies. And on the other hand, many research studies confirm that a clear gap between HEIs competence development and market demands resulted in a significant shortfall of the workforce and working-life-ready graduates. The most interesting thing in these studies shows the lack of suitable working-life candidates causing this shortfall rather than the organisation's willingness to hire. In Finland, the education ministry has manifested future-proofing of the education system to meet the demand of modern businesses and a hyperconnected world under the Vision 2030 development. In Vision 2030, one of the key development areas identified was a modern curriculum design and development that meets the rapidly changing demands of working life and society. Laurea University of Applied Sciences has positioned its education offering to fill the gap demand gap and towards Vision 2030. Laurea adopted online education and an innovative pedagogical model that strengthens students' futureproof competence development and workforce capacity building. A student-centric working-life competence development, a journey from classroom teaching towards 'Onlife' learning presents the pedagogical best practices. The paper focuses on the adaptation of continued curricula development, adopting modern online pedagogical and education approaches, and increasing industry cooperation and work-life practices. The paper addresses two-fold challenges, including meeting the demands of working-life professionals and future-proofing education offerings.

Keywords: Digital transformation, Working-life ready graduates, Futureproof higher education, Working-life competence development, Digital pedagogy best practices

1. INTRODUCTION AND BACKGROUND

The rapid pace of technological change and the increasing complexity of the global economy are placing new demands on higher education institutions. With the rapid digital transformation and evolving market needs, traditional teaching methods are being replaced by innovative pedagogical practices that integrate real-world experiences and industry cooperation (Capogna, et al., 2021, Rathod and Kämppi, 2021). To prepare students for the challenges of working life, European Higher Education Institutes

(HEIs) need to adopt new pedagogical approaches that focus on developing students' working-life competencies. The paper highlights the importance of aligning curriculum design with the demands of working life and examines the role of Laurea University of Applied Sciences in spearheading this educational revolution. The research also identifies pedagogical best practices for designing engaging online courses, blending theory with practical experiences, fostering collaborative learning and cooperation with working-life partners (Jassim, 2022; Clark-Wilson, et al., 2020; Ezugwu, Ofem, Rathod., 2016). The implications and benefits of student-centric competence development are discussed, emphasising its potential to address workforce demands, future-proof education offerings, and enhance workforce capacity (Vuorikari, Kluzer and Punie, 2022; Punie, et al., 2017).

Further, this paper argues that a student-centric approach to working-life competence development is essential for future-proofing the education system. A student-centric approach puts the learner at the centre of the learning process and empowers them to take ownership of their own learning. This can be achieved through the adoption of modern online pedagogical approaches, such as blended learning, and collaborative learning with symbiotic learning approaches (Monteiro & Leite, 2021). The paper begins by providing a brief overview of the digital transformation of higher education institutions. It then discusses the gap between the demands of working life and the skills and competencies of graduates. The paper then outlines a vision for future-proofing the education system through a student-centric approach to working-life competence development (Voinea and Roijakkers, 2023). Finally, the paper discusses the implications and benefits of this approach.

2. THE DIGITAL TRANSFORMATION OF HIGHER EDUCATION INSTITUTIONS IN EUROPE

The digital transformation of higher education institutions is a global phenomenon driven by several factors, including the increasing availability of online learning resources, the growing demand for lifelong learning, and the need to prepare students for the challenges of working life in the 21st century (Garrison, 2017). For example, digital transformation is a major force reshaping higher education institutions (HEIs) in the European Union (EU).

The European Union (EUA, 2021; EC, 2020a; EC, 2020b) responded relatively well to the digital age by adopting new technologies and teaching methods as a process of the digital transformation of HEIs. And the digital transformation of higher education institutions presents many challenges, including and not limited to: (1) Major investment needs in new technologies, especially digital technologies, which can be expensive to purchase and maintain. (2) To train staff on new technologies, especially the staff need to be trained on how to use new technologies effectively in teaching and research. (3) The need to ensure students have access to digital technologies Not all students have access to the same level of digital technology. (4) The need to develop new curricula, programmes, and teaching-pedagogical methods (Anderson, 2020; Monteiro & leite, 2021). Digital technologies can be used to create new and innovative teachingpedagogy methods within the market-demanded degree programmes.

The Future of Digital Transformation in Higher Education: The digital transformation of higher education institutions can also bring several benefits, including and not limited to only the benefits discussed in this section. The digital transformation of higher education is an ongoing process. As new technologies emerge, higher education institutions must continue to adapt and innovate. The future of higher education will be increasingly digital, and institutions that can embrace the digital transformation will be better positioned to succeed. The digital transformation of higher education institutions has a number of implications for pedagogy. Traditional teacher-centered pedagogy is no longer sufficient in a digital age (Bates, 2015). Students need to be actively engaged in the learning process, and be able to access information and resources from a variety of sources. Modern online pedagogical approaches, such as blended and collaborative learning, can help achieve this.

The Role of the Digital Pedagogy: As we understood from the above section, digital pedagogy is a practice using digital technologies and tools to support learning and teaching. ***Following are the key***

aspects of digital pedagogy (Rathod & Kämppi, 2021; Siemens, 2005; Bates, 2015): Active learning, Personalisation, Flipped classroom, Blending learning, Fully online or distance learning, Collaboration, Accessibility, and Assessment.

Symbiotic learning and teaching processes play a vital role; it critically argues that digital pedagogy is not simply about replacing traditional teaching methods with technology but instead using technology to enhance and support teaching and learning in ways that were not previously possible (Anderson & Dron, 2011).

Symbiotic learning systems can be applied in HEIs to improve the effectiveness and efficiency of learning and decision-making. The effective implementation of digital pedagogy and symbiosis learning methods can significantly improve the quality of learning and teaching in EHEA[11] (Mayer, 2014; Siemens & Tittenberger, 2009)

3. GAP ANALYSIS- COMPETENCIES DEVELOPMENT AND MARKET DEMANDS

There is a growing gap between the demands of working life and the skills and competencies of graduates (EUA, 2019; EUA, 2020a; EC, 2020c; CEN, 2021; Vuorikari, Kluzer and Punie, 2022). This gap is due to several factors, including the rapid pace of technological change, the increasing complexity of the global economy, and the changing nature of work. The European Union (EU) has also been facing number of challenges in recent years, including a skills shortage, an ageing population, and a changing labour market. These challenges have led to a gap between workers' skills and the skills demanded by the market. To address this gap, the EU has developed several initiatives, including the European Qualifications Framework (EQF), European Skills Agenda, EU Digital Framework (DigiComp), European e-Competence Framework (e-CF), European Cybersecurity Skills Framework (ECSF) and initiatives like ESCO (European Skills, Competencies, Qualifications and Occupations) Classifications.

The EQF is a common reference framework for qualifications across the EU. It provides a way to compare qualifications from different countries and sectors. The European Skills Agenda is a set of policy measures to improve skills development and lifelong learning. Despite these initiatives, the gap between working-life competence development and market demands remains a challenge in the EU. Several factors contribute to this gap. The gap between working-life competence development and market demands is a significant challenge for the EU. However, it is a challenge that can be overcome through a combination of policy initiatives, investment in education and training, and a commitment from all stakeholders to realistically respond to the digital transformation phenomenon.

4. FUTURE-PROOFING THE EDUCATION SYSTEM IN FINLAND: VISION 2030

Finland has long been a leader and renowned for its successful education system, consistently ranking at the top of international assessments. In recent years, the Finnish government has developed and set forth a vision for education in 2030, focusing on future-proofing the system and its educational landscape to meet the challenges of a rapidly changing world. Finland's Vision 2030 and its significance in creating an education system that meets the evolving needs of the future. To future-proof the education system, HEIs need to adopt a student-centric approach to working-life competence development. This approach should focus on developing students' ability to think critically, solve problems creatively, and collaborate effectively.

The Finnish higher education institute Laurea University of the Applied Sciences (Laurea) is also reshaping its vision for the future by leveraging the advantages of digital transformation with a new

[11] European Commission. (2018). Digital Education Action Plan. Retrieved from https://ec.europa.eu/education/sites/education/files/digital-education-action-plan-jan2018_en.pdf

pedagogical practice model and student-centric approaches to working-life competence development. This can be achieved by adopting modern online pedagogical approaches and renewed student development processes, including blended learning and collaborative learning with learning by developing (LbD) practice model (Garrison, 2017; Bates, 2015). Blended learning combines traditional face-to-face instruction with online learning activities. Collaborative learning involves students working together to solve problems and complete tasks. Online and distance learning is more for students who are looking for a flexible, affordable, and convenient way to learn. The paper presents the student-centric working-life competence development best practices from the case study of the Laurea University of Applied Science's Business Information Technology (BIT) degree programme as described in the following sections.

5. STUDENT-CENTRIC WORKING-LIFE COMPETENCIES DEVELOPMENT

The European business environment and communities are rapidly changing, and it is more important than ever for students to develop the working-life competencies they need to succeed in the workforce (EC, 2020a; EC, 2020b; EC, 2020c). This is especially true in business information technology (IT), where new technologies and trends are constantly emerging. Student-centric working-life competence development is an approach to learning that focuses on the individual student needs and working-life's requirements. It is based on the idea that students learn best when they are actively engaged in the learning process and when they can apply what they are learning to real-world situations, workplace development and solving societal or business challenges. To prepare students for the workforce, Laurea's business information technology (BIT) programme realised the importance of focusing on developing students' working-life competencies. Working-life competencies are the skills and knowledge that enable individuals to succeed in the workplace. Working-life competencies include the most important aspects, such as building a solution-oriented mindset, creating a goal- and target-oriented study plan, problem-solving, critical thinking, teamwork, communication, and developing professional-ethical competencies through pedagogical practices.

A student-centric approach to working-life competence development has several benefits for students. It can help students to develop their critical thinking, problem-solving, and collaboration skills. It can also help students to become more self-directed learners and to develop a lifelong learning mindset. A student-centric approach to working-life competence development also has several benefits for employers. It can help employers find graduates with the skills and competencies they need. It can also help employers to improve their workforce productivity and innovation. Laurea University of Applied Science, Finland's two researchers (Rathod and Kämppi, 2020) embarked on the journey to develop a degree programme that meets the need for working-life competencies and future-proofing the education programme. Their development approach is based on the Laurea and Finland's education strategical vision that includes "research first," "real-world needs," and "human-growth." They conducted various studies, including market demand, discussing with industry experts, observing real-world needs, expert group workshops, brainstorming with thought leaders and mastermind groups, attending seminars, knowledge sharing amongst professional colleagues, participating-engaging with knowledge cluster networks, students' feedback, and teamwork on the various level. The educational ministries' vision and strategies played a vital role during this development work. The study's outcome can be summarised by identifying the key working-life competencies described below.

The following are some specific examples of working-life competencies that can be developed through student-centric learning: (1) Goal-oriented targets, (2) Learning-oriented mindset, (3) Creative and Critical thinking, (4) Problem-solving and solution-oriented mindset, (5) Adaptability, (6) Self and time-management, (7) Teamwork and communication, (8) Decision-making, (9) Empathetic and value-based practices, (10) Ethical and Professionalism, (11) Digital and content professional proficiencies, (12) Leadership and Life-long learning.

Our working-life partners and studies confirm that students can be well-prepared for success in the workforce by developing these competencies. These competencies development integrated with the

business information technology degree programmes with two specialisation tracks in cybersecurity and digital service development.

6. PEDAGOGICAL BEST PRACTICES FOR DEVELOPING STUDENT-CENTRIC WORKING-LIFE COMPETENCIES

Our study confirms several pedagogical best practices that can be used to implement a student-centric approach to working-life competence development, including and not limited to designing engaging and interactive online courses, considering human-development approaches, blending theory with practical experiences, and facilitating collaborative learning and industry partnerships. However, our case study found it too difficult to realise in the practices. This case study leverages the digital pedagogy's benefits and working-life-driven approaches.

Our study finds that the student-centric approach to working-life competence development has several implications and benefits. There are implications and benefits that address working-life professionals' demands, future-proofing education offerings and enhancing workforce capacity and competence development. The following sub-sections present our findings and best practices of the student-centric working-life competencies development.

Goal-oriented Learning with Personal Study Plan: Goal-oriented learning can help students to achieve their goals, succeed in their studies, and develop the skills they need for their future careers (Garrison, 2017; Rrmillstf, Steenbrugge, Machalow et al. 2021).

Implementation in practice: Laurea BIT programme introduces the students to the personal study plan (PSP), recognising students' previous competencies and planning overall working-life growth. The process helps- what do students want to achieve by the end of their degree? Once they know what they want to achieve, their personal study plan, courses and assignments are helping them to develop a plan for how they are going to achieve it. The personal study plan helps students to identify their learning goals, break down large goals into smaller, more manageable tasks, set deadlines for each task, provide regular feedback on students' progress, and celebrate successes.

Developing Learning-oriented Mindset with Pedagogical and Working-life Skills: It is evident that most students do not realise the values of pedagogical development. Most of the students focus on cognitive development rather than holistic human growth mindset. First and foremost, many students are unaware of what it means to learn and pedagogical practices (Anderson, 2020; Palloff & Pratt, 2007).

Implementation in practice: Laurea BIT has introduced an orientation course that teaches students the learning theories, and learning approaches, to be learning-oriented, be curious, embrace study challenges, be persistent, be self-aware, respect different opinions, seek feedback, self-management, time-management, and celebrate success. The study plan includes the following study units (micro-courses) in students' personal study plan.

- Study Skills and Professional Orientation (2 ECTS)
- Professional Development (2 ECST)
- Starting a Successful Career (1 ECTS)

The above courses provide inductions and awareness of the working-life skills development, including goal-oriented, learning-oriented mindset, creative and critical thinking, problem-solving and solution-oriented mindset, adaptability, self and time-management, communication, teamwork, decision-making, empathetic and value-based practices, ethical and professionalism, digital and content professional proficiencies, leadership, and life-long learning.

Furthermore, advanced courses in cybersecurity also offer students an orientation module that includes (1) Course goal setting with a personal study plan, (2) The learning and pedagogical workshop and

study materials (3) Ethical and professional commitment to studies. The orientation module teaches students the importance of learning, studying, and pedagogical practices. This empowers students to focus on learning and studying rather than solely focusing on grades. Therefore, grades are not the primary focus; instead, the emphasis is on learning, professional development, and personal growth, which are the most important aspects of the educational programme.

These practices encourage students to reflect on their learning and provide them with opportunities to practice self-regulation, professional development, creative and critical thinking with a supportive learning environment.

Self and Time-management: Many studies (Monteiro & Leite, 2021; Dumitru, Radovici, Rasiti and Veselinovic, 2023; Vuorikari, Kluzer and Punie, 2022) confirm the challenges faced by higher education students in managing themselves, as well as time and resources. Our study confirms that developing good self- and time-management skills helps students succeed more efficiently, leading to improved self and time management and eventually developing efficient resource management skills.

Implementation in practice: In practice, advanced BIT programme courses offer students personal study plan with goal-setting assignments that help students precisely plan their target grades level, identify content targets, identify learning method, and time management with the entire course schedule with manageable weekly modules and study time plan, the importance of the students' values for the course target, celebrating success, ethical and professional practices. This helps students set realistic expectations from the course along with realistic goals, create a schedule, eliminate distractions, start working on assignments early, take care of their health, well-being and seek help when needed, adapting to personal learning methods, and understand the importance of professional and ethical values.

Problem-solving and Solution-oriented Mindset: The course learning activities and assignments encourage students to find solutions to problems and come up with creative solutions (Bates, 2015).

Implementation in practice: Every module within a course includes self-learning assessments and different assignments encouraging students to brainstorm and providing them with opportunities to work on real-world problems. Teachers are open about their own problem-solving process and share mistakes. The pedagogical approach provides opportunities to try new things and fail. We are continually encouraging students to find sensible solutions and not dwell on the problems all the time by analysing the situation effectively. It is vital to provide students with real-world problems, opportunities to practice problem-solving, feedback on their problem-solving skills, a supportive learning environment, encourage collaboration and use available technology freely. We have experienced that the more students practice problem-solving, the better they are becoming at finding solutions.

Creative and Critical Thinking Skills: The higher education promotes and empowers students to be deep thinkers and positive doers (Voinea & ROijakkers, 2023). It is essential to intertwine such skills development within each phase of the studies.

Implementation in practice: The course learning activities and assignments encourage students to foster critical thinking and encourage students to ask questions. We provide these opportunities through discussion forums where students can discuss course material, participate in debates, and write learning reflections that require students to explore different perspectives. As explained in the previous section that providing opportunities with problem-based learning that focuses on real-world problems. Students are given a problem to solve. This type of learning requires students to use critical thinking skills to analyse the problem, identify possible solutions, and evaluate the pros and cons of each solution.

A supportive environment is essential for fostering creativity and critical thinking. Students need to feel safe to take risks and share their ideas. Instructors can create a supportive environment by being encouraging, open-minded, and respectful of all students. The course assignments expose students to a

variety of perspectives. This is done by assigning readings from different authors and sources, inviting guest speakers from different backgrounds, and encouraging students to participate in workshops, seminars, and hackathon. In addition, we provide an opportunity to students how to evaluate information. This includes teaching them to identify credible sources, distinguish between fact and opinion, and identify bias. Additionally, helping students develop their voice. This means encouraging students to be original, to take risks, and to express themselves in their own unique way. The teachers provide these opportunities in communications, tutoring, assignments, self-reflections, and counselling, along with working-life event participation where they can network and express themselves freely.

Ethical and Professionalism Skills: The course learning activities and assignments encourage students to develop ethical and professional skills (Rovai, 2004). The courses are developed in a way that offers the process of teaching students the values and behaviours expected of them in their professional lives. This includes honesty, integrity, respect, and responsibility, along with the professionalism of communicating effectively, solving problems, and working collaboratively.

Implementation in practice: Laurea BIT programme offers study units(courses) that provide opportunities for ethical and professional skills development, as it is an important investment in the future of students. As referred to in previous sections, advanced courses in cybersecurity also offer students an orientation module that includes learning tasks and learning activities that help students with (1) Course goal setting with a personal study plan (2) The learning and pedagogical workshop, and study materials (3) Ethical and professional commitment to studies.

By developing these skills, students can increase job satisfaction, improve career prospects, enhance workplace relationships, and increase productivity along with their chances of career success and positively impact the communities.

Professional Skills Development: During the market demand studies, it was frequently reported that every job advert and company seek professional certification from potential employees (EC, 2020c; Vuotikari, Kluzer and Punie, 2022). It is especially evident in the field of information technology (IT and ICT).

Implementation in practice: Laurea BIT degree programme reviews the curriculum regularly, working with industrial partners and expert groups in addition to the "research first" approach. The cybersecurity specialisation curriculum is mapped with working-life professional certifications, working-life methods, and proven frameworks. Now, the student finishing the course, is provided with an opportunity for the professional training, comprehensive studies in the professional certification body of knowledge, hands-on practices, applications of the learnt skills and participating in professional events. The research confirms that professional certification is a credential that demonstrates that an individual has met the specific knowledge, skills, and abilities required to perform a particular job or occupation.

The Laurea BIT programme's many courses are mapped with these professional certification and body of knowledge training. Therefore, the education offering is directly relevant to workforce capacity-building efforts. The successful students in the courses can demonstrate their expertise to employers and potential employers, gain access to professional development opportunities, stay up to date on the latest trends in their field, network with other professionals and enhance their career prospects.

Teamwork and communications: It is evident from the market demand studies (EC, 2020c; Vuotikari, Kluzer and Punie, 2022). teamwork and communication are essential skills for success in higher education and the workforce. During our job portal analyses- many jobs require employees to work collaboratively with others from different backgrounds and cultures. Teamwork and communication skills can help students succeed in their studies and prepare them for the workforce. Teamwork skills offer the ability to work effectively with others, resolve conflict, and share ideas. Communication skills empower the ability to express oneself clearly, listen attentively, and build relationships.

Implementation in practice: Laurea BIT programme and courses integrated these skills development process working in experiential learning, including problem-solving tasks, project tasks, simulations tasks, applied learning tasks, real-world assignments, and project work with working-life partners. The teamwork, communications and professional skills develop by participating in workshops, seminars, webinars, and hackathon events, including industry visits. The courses offer many of these possibilities, including participating in EU and National Innovation projects, including ECOLHE project tasks.

Leadership and lifelong learning: Leadership and lifelong learning are two important concepts necessary to intertwine in HEIs (Bates, 2015; Jonassen, 1999; Lave & Wenger, 1991). Leadership refers to the ability to serve, influence and motivate others. In contrast, lifelong learning refers to the ongoing process of acquiring new knowledge and skills. Our study also confirms that it is more important than ever for students to develop strong leadership and lifelong learning skills in the rapidly changing world. Leaders are needed in all sectors of society. On the other hand, to be successful in today's economy, workers need to adapt to change and continue learning throughout their careers.

Implementation in practice: Laurea's advanced cybersecurity courses offer an opportunity for the students to develop their learning skills and value the importance of lifelong learning, strategic thinking, problem-solving and decision-making skills. These competencies developed through various modes, including learning activities and tasks, learning reflections, participating in professional training, offering short workshops, hands-on practices, professional event participation, and networking with working-life professionals and partners.

7. CONCLUSION

In conclusion, a student-centric approach to working-life competence development is essential for future-proofing the education system.

A student-centric approach to working-life competence development is an educational philosophy that focuses on the needs and interests of the individual student. This approach emphasises student engagement, active learning, and the development of transferable skills that are relevant to the workplace.

There are several reasons why a student-centric approach to working-life competence development is essential for future-proofing the education system. First, the world of work is changing rapidly, and the skills that are needed for success in the future are constantly evolving. A student-centric approach can help students to develop the skills they need to adapt to change and to be successful in whatever career they choose. Second, the traditional model of education, which is based on a teacher-centered approach, is no longer effective for many students. In this model, the teacher is the primary source of information, and students are expected to passively receive this information. However, research has shown that students learn best when they are actively engaged in the learning process. A student-centric approach can help to make learning more active and engaging for students. Finally, a student-centric approach can help to improve student motivation and achievement. When students feel that they are in control of their own learning, they are more likely to be motivated to learn and to achieve their goals.

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REFERENCES

[1] Capogna, S., Cocozza, A., Cecchini, G., De Angelis, M. C., De Gennaro, G., Poggi, B. D., & Proietti, E. (2021). Digital Technologies in HE: from the European vision to the university governance-European framework

[2] Jassim, L. L. (2022). Using E-learning technologies in teaching and learning process. *International Journal of Social Learning (IJSL)*, *1*(1), 15-23.

[3] Clark-Wilson, A., Robutti, O., & Thomas, M. (2020). Teaching with digital technology. *Zdm*, 1-20.

[4] Ezugwu, A. E., Ofem, P. O., Rathod, P., Agushaka, J. O., & Haruna, S. (2016). An empirical evaluation of the role of information and communication Technology in Advancement of teaching and learning. *Procedia Computer Science*, *92*, 568-577.

[5] Vuorikari, R., Kluzer, S. and Punie, Y., DigComp 2.2: The Digital Competence Framework for Citizens - With new examples of knowledge, skills and attitudes, EUR 31006 EN, Publications Office of the European Union, Luxembourg, 2022, ISBN 978-92-76-48883-5, doi:10.2760/490274, JRC128415.

[6] Punie, Y., editor(s), Redecker, C., European Framework for the Digital Competence of Educators: DigCompEdu , EUR 28775 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-73718-3 (print),978-92-79-73494-6 (pdf), doi:10.2760/178382 (print),10.2760/159770 (online), JRC107466.

[7] Monteiro, A., & Leite, C. (2021). Digital literacies in higher education: Skills, uses, opportunities and obstacles to digital transformation. Revista de Educación a Distancia (RED), 21(65).

[8] Dumitru, C., Radovici, M. C. M., Rasiti, G., & Veselinović, L. (2023). Science and Learning in the Digital Era. Der Donauraum, 63(1-2), 83-98.

[9] Anderson, V. (2020). A digital pedagogy pivot: re-thinking higher education practice from an HRD perspective. Human Resource Development International, 23(4), 452-467.

[10] Remillard, J. T., Van Steenbrugge, H., Machalow, R., Koljonen, T., Krzywacki, H., Condon, L., & Hemmi, K. (2021). Elementary teachers' reflections on their use of digital instructional resources in four educational contexts: Belgium, Finland, Sweden, and US. ZDM–Mathematics Education, 53(6), 1331-1345.

[11] CEN European Committee for Standardization EN 16234-1:2021; e-Competence Framework (e-CF)—A common European Framework for ICT Professionals in all sectors—Part 1: Framework 2021. CEN/CENELEC: Brussels, Belgium, 2021

[12] Rathod, P., & Kämppi, P.. (2021). Empower Competencies for Online Learning in Higher Education: An European Union Innovation under European Commission Project (ECOLHE), Report

[13] Siemens, G. (2005). Connectivism: A learning theory for the digital age. International Journal of Instructional Technology and Distance Learning, 2(1), 3-10.

[14] Bates, A. W. (2015). Teaching in a digital age: Guidelines for designing teaching and learning. BCcampus.

[15] Anderson, T., & Dron, J. (2011). Three generations of distance education pedagogy. The International Review of Research in Open and Distributed Learning, 12(3), 80-97.

[16] Jonassen, D. H. (1999). Designing constructivist learning environments. In C. M. Reigeluth (Ed.), Instructional-design theories and models: A new paradigm of instructional theory (Vol. 2, pp. 215-239). Lawrence Erlbaum Associates.

[17] Lave, J., & Wenger, E. (1991). Situated learning: Legitimate peripheral participation. Cambridge University Press. https://doi.org/10.1017/CBO9780511815355

[18] Rovai, A. P. (2004). A constructivist approach to online college learning. Internet and Higher Education, 7(2), 79-93. https://doi.org/10.1016/j.iheduc.2004.02.001

[19] Palloff, R. M., & Pratt, K. (2007). Building online learning communities: Effective strategies for the virtual classroom (2nd ed.). Jossey-Bass.

[20] Garrison, D. R. (2017). E-Learning in the 21st century: A framework for research and practice. Routledge. https://doi.org/10.4324/9781315162862

[21] Mayer, R. E. (2014). The Cambridge handbook of multimedia learning. Cambridge University Press.

[22] Kämppi, P., & Rathod, P. (2020, October). Applying LEAN Principles to Improve Introductory Cybersecurity Online Course: Findings From the Pilot Study. In SITE Interactive Conference (pp. 73-79). Association for the Advancement of Computing in Education (AACE).

[23] European Commission. (2018). Digital Education Action Plan. Retrieved from https://ec.europa.eu/education/sites/education/files/digital-education-action-plan-jan2018_en.pdf

[24] European University Association. (2021). Roadmap for Digital Transformation of European Universities. Retrieved from https://eua.eu/resources/publications/1143:roadmap-for-digital-transformation-of-european-universities.html

[25] European Commission. (2020a). European Digital Strategy. Retrieved from https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/european-digital-strategy_en

[26] European University Association. (2021). Recommendations for the Digital Transformation of European Universities. Retrieved from https://eua.eu/resources/publications/1142:recommendations-for-the-digital-transformation-of-european-universities.html

[27] European Commission. (2020b). Shaping Europe's digital future. Retrieved from https://ec.europa.eu/info/publications/communication-shaping-europes-digital-future_en

[28] European University Association. (2019). EUA Trends 2019: Learning and Teaching in the European Higher Education Area. Retrieved from https://eua.eu/resources/publications/871:eua-trends-2019-learning-and-teaching-in-the-european-higher-education-area.html

[29] European Commission. (2020c). Building a European Data Economy. Retrieved from https://ec.europa.eu/digital-single-market/en/policies/building-european-data-economy

[30] European University Association. (2019). EUA Roadmap on Open Science 2021-2025. Retrieved from https://eua.eu/resources/publications/849:eua-roadmap-on-open-science-2021-2025.html

[31] European Commission. (2020d). White Paper on Artificial Intelligence. Retrieved from https://ec.europa.eu/info/publications/white-paper-artificial-intelligence-european-approach-excellence-and-trust_en

[32] European University Association. (2021). Policy Brief on Digital Education Transformation in European Universities. Retrieved from https://eua.eu/resources/publications/1144:policy-brief-on-digital-education-transformation-in-european-universities.html

[34] Voinea, C. L., & Roijakkers, N. (2023). Educating for the Future. In Futurology in Education and Learning (pp. 1-4).

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THE EUROPEAN STUDENTS' PERSPECITVE OF DIGITAL TEACHING AND LEARNING IN HIGHER EDUCATION

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ABSTRACT

The increase in the use of online training connected to the pandemic emergency has highlighted, as never before, that Higher Education Institutions have to deal with the digital revolution, promoted by the European Community since 1998 from the so-called Bologna Process. This work illustrates the results of the students' survey of the "Empower Competences for Onlife Learning in Higher Education" (ECOLHE) project. the project aimed to investigate the transformation processes and of developing practices of higher education's digital teaching and learning in several European countries. The research project was based on the hypothesis that the availability of technological infrastructures does not grant an efficient and effective use of ICTs by professors, students, and researchers.

ECOLHE means "empower competences for online learning in higher education". The project started the first of September 2020. The aim of ECOLHE is examine the way in which the idea of e-learning European higher education area has been translated into practice at national level by academic bodies. Our purpose is to identify the way in which the digital challenges to promote Lifelong learning **LLL through ICT in HE** is shaped in specific contexts.

The project is going on by a consortium of five partner countries that are Italy, Spain, Ireland, Grease and Finland. Universities involved in the project are E-Campus University, Roma Tre University, University Oberta de Catalunya, University College Cork, University of Patrón and Laurea University.

ECOLHE is an action research project that aims to create the best conditions of exchange best practices in: Teaching digital skills in higher education; Training course for teachers and tutors for improving online teaching in higher education in the logic of Lifelong learning, inclusion and innovation recalled by high-level Group of the Modernization HE; Recognition and validation of teaching competencies in higher education for teachers' Professional development; Recommendations for academic bodies.

The main activities are developed following a stepwise approach. In the first step the project produces the Comparative Research Report on Digital Technologies in higher education: from the European vision to the University. This report represents the first intellectual output where each partner country realizes its Case Study. We mixed together both qualitative tools, such as focus group and interviews, and quantitative tool, i.e. a questionnaire for the students survey online. Aims and scope of the

questionnaire was to investigate students' perception about the ability of integrating digital Technologies into organizational and training processes supporting teaching/learning activities. The questionnaire wasvalidated and explored the following sections: teaching innovation, students' achievement and students' experience. By means of Survey Monkey system, we collected 1148 of students from the countries partners. Despite the distribution of gender was sometime unbalance, the analysis was not affected, since gender distribution is statistically independent by the country. Data have been analysed country by country and compared, which is the focus of this paper.

The comparative study was carried out with the aim of addressing 3 research questions that are:

RQ1: Which is the University partner having the best digital practices?

This RQ is addressed with the aim at Comparing Universities in terms of digital maturity. To address this RQ the Principal component analysis has been chosen as the statistical method for the analysis. Principal component analysis is a technique useful for summarizing latent concepts underlying a group of variables. Throughout the technique the dimension of data can be reduced with an insignificant loss of information.

RQ2: Which are the latent factors characterizing student's digital maturity?

This RQ is addressed with the aim at exploring latent dimensions in the questionnaire. To address this RQ the Explorative Factor analysis has been chosen as the statistical method for the analysis. Explorative factor analysis helps in exploring how many different latent dimensions underly variables through responses.

RQ3. How involved students can be classified?

This RQ is addressed with the aim at profiling students according to latent aspects. To address this RQ the Cluster analysis has been chosen as the statistical method for the analysis. Cluster analysis helps in highlighting groups of units that are meant to be similar to each other with respect to some criteria.

RQ4. Are latent factors of digital maturity, in average, really different among Universities?

This RQ is addressed with the aim at understanding if average values of latent components of digital maturity are different across Universities. To address this question, we proceeded into two steps. Firstly, we checked if latent dimensions average values are statistically different and then, if this may be due to Universities. To address the first step the analysis of variance.

THE DIGITAL MATURITY OF THE UNIVERSITY

To address RQ1 a first selection of items has been done. The items in the questionnaire able to express the concept of digital maturity are displayed in table 1 with the related factor loadings.

Table 1: items and PC1

Explained variance by PC1	**63%**
	Loadings
The faculty organization/structure is clear to me	0.788
Announcements from the administrative staff are clear	0.754
Teachers provide me the support that I need	0.842
Teachers are engaged in the teaching process	0.822
Teachers are digitally competent	0.782
Technology and learning portals	0.764
ICT Tools and platforms are intuitively used	0.766

The principal component underlying them can replicate the 63% of variability. Factor leadings play the role of weights by means of item take part in defining the digital maturity and, thus, help us in defining *digital maturity* more precisely.

Statistically speaking, averages have been simultaneously compared by each other's by the HSC Tukey test that can be used to find means that are significantly different from each other. Results can be briefly summarized as follows: E-campus, Laurea University and Roma Tre University have an average value of digital maturity similar to each other and to other universities, but UOC and Patras University; Patras University has an average value of digital maturity different from all the others; and UOC average value of digital maturity is different from all the other values but UCC.

Concluding, we can say that UOC has the highest level of digital maturity considering only the item selected and Patras University the lowest whilst the UCC college University of Cork is going closer to the best performance of Spain.

STUDENT'S DIGITAL MATURITY FACTORS

However, the level of digital maturity assessed selecting only some items does not seem satisfactory to us, both due to the limitations connected with the selection bias, and the exclusion of some items. All the items of the survey reveal the level of digital maturity, that is composed by different dimention. Then, we choose to adopt a principal component analysis procedure to identify the latent dimensions that constitute the digital maturity.

For this reason and to address RQ2, all items have been used. Explorative factor analysis with the principal components' method was carried out. The right n° of factors to extract is usually chosen based on the % of cumulative variance replicated by factors or up to the first eigenvalue less than 1As shown in table 2, the number of factors having an eigenvalue less than 1 is five. That is, there are five components constituting student's digital maturity.

Table 2: variance explained by factors

Latent factors	***Initial eigenvalues***	***% variance***	***% cumulative***
1	14.436	40.1	40.1
2	2.996	8.322	48.423
3	1.956	5.434	53.856
4	1.398	3.884	57.741
5	1.063	2.953	60.694

Once factors have been extracted, varimax rotation with Kaiser normalization has been applied with the aim of catching the meaning of each factor on the basis of factor loadings.

The first factor explains the 40% of the variance, then this is the most important component of student's digital maturity. As it is shown in table 4, this digital maturity component is made of 10 variables, and it describes the perceived benightment of students about their higher educational experience (teaching and more). For this reason, the factor has been called *Digital Tuning*. This component account for the student's tuning with digital training processes, which improves their learning activities making their experiences more efficient and effective.

Although the other four components explain overall half of the first component variance, then are less relevant than digital tuning for digital maturity, they account for relevant aspect in term of its quality. The second factor explains the 8% of the entire variability of data, than it is less relevant than digital tuning in explaining digital maturity although it highlights a different element involved in it: *Teaching innovativeness*. In fact, it is made of 10 variables (Tab. 4), which account mostly for tools and methods of the training process. The third factor explains 5% of variance and is made of 7 variables (Tab. 4), highlighting the relevance of soft skills for the digital maturity, and for this reason it is called *Soft skills*, Then, it catches the capacity of the University to teach soft skills to the students. The fourth factor explains the 4% of total variability and is made of 7 variables. It describes the perception of students to be enrolled in the job market after their studies, so it has been called *Eemployability.* The last factor, namely *Positive relationships*, and it explains the 3% of total variability, since it is mad of 2 variables: students are respectful towards peers, and their being at ease with peers. Then, It catches the students' trustful positive sentiment of being in relations with others.

STUDENTS' DIGITAL LEARNING STYILES

To address RQ3 factors have been used to classify students by means of cluster analysis. Cluster analysis helps in highlighting groups of units that are meant to be similar to each other with respect to some criteria. After having explored by a dendrogram the proper number of clusters, the k-means analysis has been carried out.

Seven clusters have been selected. Their interpretation can be done by observing means of cluster centroids (Tab.5) that help in providing a name for each cluster.

Table 3: cluster centroids

Cluster number & label		Digit. Tuning	Teaching Innov.	Soft Skills	Employab.	Positive Relation.
1	Job focused	-0,9	-0,42	-0,05	1,07	0,43
2	Task Oriented	-0,1	0,28	-1,75	-0,56	0,23
3	Cosmic Pessimists	-1,05	-1,39	-1,05	-0,39	-0,91
4	Self-realizaton Focused	0,7	0,52	0,04	0,4	0,38
5	Teacher Centered	-0,6	0,94	0,32	-0,2	-0,75
6	Lone Rider	0,7	-0,71	0,17	0,23	-1,42
7	Social	0,12	-0,56	0,7	-0,92	0,64

Job focused: is a group of 162 students representing the 14.1% of the total sample. They are focused mostly on the *employability* and seems to be less interested in digital. Task-oriented: is a group of 102 students representing 8.9% of the entire sample. They are interested on average to all the digital components but the *soft skills*. They seem to be practical and effective not really caring to relational effectiveness. Cosmic Pessimists: is a small group of 56 students (4.9%) interested in none of the digital components but are the employability. Perhaps they are not favourable to digital training. Self-realization Focused: is the largest group of students (307 representing 26.7%) interested in all the aspects highlighted by latent factors, and they are definitely *digital tuned*. Teacher Cantered: is made of 179 students (15.6%). It does not care about peer's relationship but focuses mostly on *teaching innovativeness* rather than being *digitally tuned.* Lone Riders: is a group of 117 students (10.2%), and It is the reverse of teacher oriented one. Both groups don't focus on peer's relationship, but these students are highly *digitally tuned* and don't care about *teacher innovativeness*. Social: is a large group of 225 students (19.6%) mostly interested in the relational activities surrounding education. They are

cantered on *soft-skills* and *positive relationship,* and they do not really focus on employability and care less about teacher innovativeness

To address RQ4 the analysis of variance, henceforth ANOVA, has been carried out. ANOVA is an inferential method for comparing means of several groups. The test analyzes whether the difference observed among sample means is still reasonable true in the populations. ANOVA compares two types of variability of the data: the variability between groups and the variability within groups. The larger the variability between groups relative to the variability within groups the larger the value of statistic test used to carry out the conclusion. Farther distance between variabilities means data support the hypothesis the means are statistically different.

Here, we use the multivariate technique to address the difference of the average of latent components is not due to the causality but to a given reason, such as the university affiliation.

Among several assumptions to properly carry out ANOVA is that the level of variance of a given variable is constant across groups. The following table shows the value of statistic test for each latent component and the related p-value. Since p-values are not statistically significant (given a level of significance equals 0.01), then we can accept the homogeneity assumption.

Table 4: homoscedasticity test result

Components	Statistica di Levene	df1	df2	Sig.
Digital Tuning	1,568	5	1142	0,166
Teaching Innovativeness	1,792	5	1142	0,112
Soft Skills	2,81	5	1142	0,016
Employability	0,787	5	1142	0,559
Positive Relationship	2,408	5	1142	0,035

Due to the result gained in Table 4, we can proceed with the analysis. By comparing, component by component, the variability between groups and within groups, we can conclude that the average of the digital maturity is different in the latent components (test is statistically significant -Table 5).

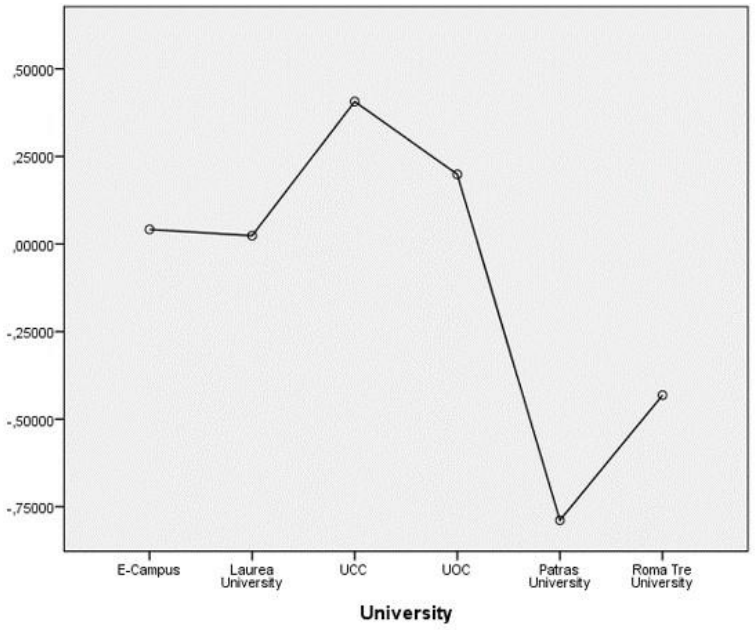
To better appreciate the difference among latent components average values across universities, the following graphs plotting means of latent components by universities. Digital Tuning seems to have a trend similar to digital maturity (Figure 1). The most tuned students are those from Spain and Ireland, two university with a long experience in digital training, followed by the Italian digital university and the Finnish one. The traditional university's Italian students are less *digitally tuned*, being however significantly more tuned than the Greeks. In fact, digital tuning seems to be related to their familiarity with the digital higher education environment.

Table 5: ANOVA result

		sum of sq.	df	Sq.average	F	Sig.
Digital Tuning	between groups	128,516	5	25,703	28,82	**0,000**
	within group	1018,484	1142	0,892		
	Total	1147	1147			
Teaching	between groups	99,251	5	19,85	21,636	**0,000**
Innovativeness	within group	1047,749	1142	0,917		

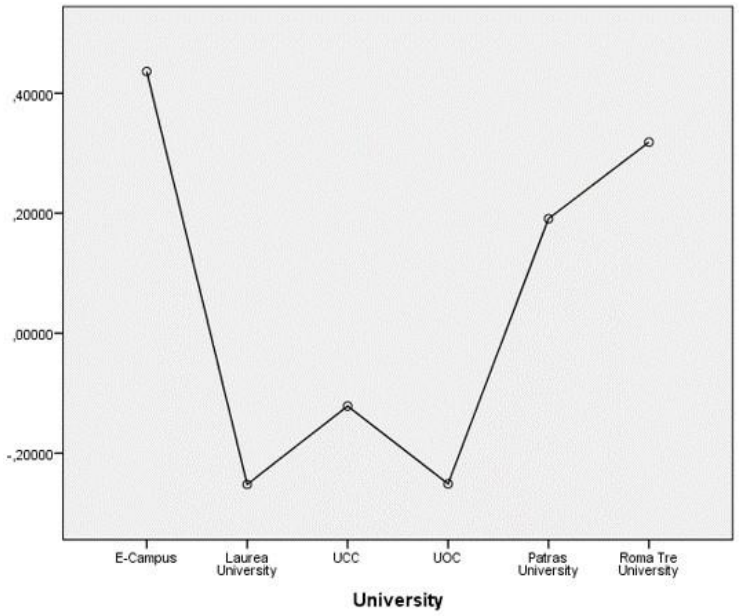
	Total	1147	1147			
Soft Skills	between groups	95,293	5	19,059	20,695	**0,000**
	within group	1051,707	1142	0,921		
	Total	1147	1147			
Employability	between groups	166,501	5	33,3	38,785	**0,000**
	within group	980,499	1142	0,859		
	Total	1147	1147			
Positive	between groups	276,672	5	55,334	72,607	**0,000**
Relationship	within group	870,328	1142	0,762		
	Total	1147	1147			

Figure 1: Digital tuning vs Universities



With regard to innovative teaching, as can be seen from the graph (Figure 2), two elements intervene: the level of digital maturity of the country and the disciplinary area of the students. Indeed, the students of the Italian and Greek universities seem to be more enthusiastic about teaching innovation than Finnish, Irish and Spanish. Probably, in digital mature countries, students are more critical on digital teaching and learning, resulting less satisfied. Conversely, students from countries still developing their digital structures and practices, students seem to be more enthusiastic. However, the Greek students are less enthusiastic than the Italians even though they are less critical than the Spanish, Finnish and Irish. It can be assumed that this is due to the type of training of these students, often coming from faculties of natural sciences such as engineering, who have greater competences and familiarity with digital processes.

Figure 2: Innovative teaching vs Universities



Finnish and Irish students consider soft skills more important than Italians (Figure 3). The Italians give them less importance as well as the Greeks who consider them less important than all. Attention to soft skills seems to be connected with the type of student interviewed. Students enrolled in faculties of natural sciences, like Greeks, seem to have less attention for this type of skills. Humanities students tend to pay more attention to this aspect.

This factor makes the difference between digital and traditional universities (Figure 4). The graph highlights how Finnish Greek and Roma Tre students are most interested in using university education to enter the world of work, while E-Campos and Finnish students seem to be interested in career opportunities. Digital universities probably do it because they already have a job, while those who choose traditional universities follow a classic path that takes people from high school to university, and subsequently enter the job market.

Between the two digital universities, the Spanish one seems to have students less interested in the possibility of entering in the job market. This is probably because Spanish students are already wormking and chose the digital university to fit their education and their working life. Wh ile E-Campus has a younger target that not necessarily is already working.

Figure 3: Soft skills vs Universities

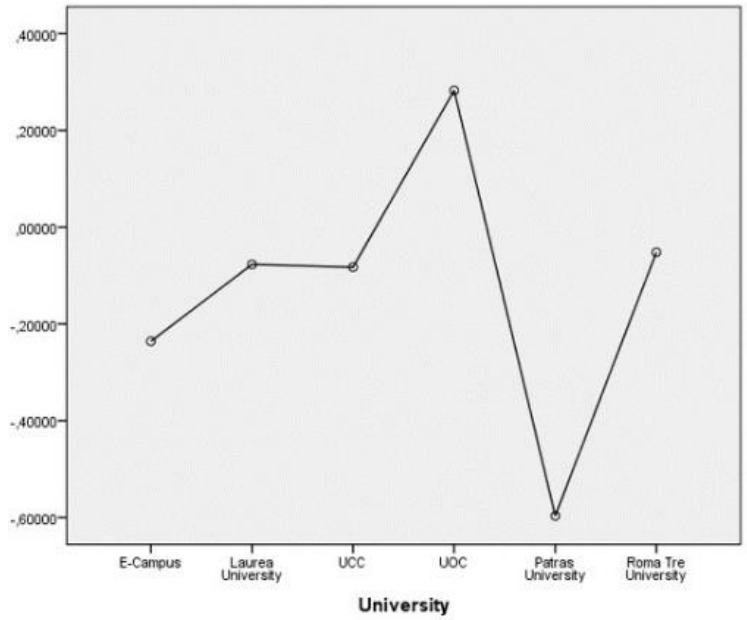
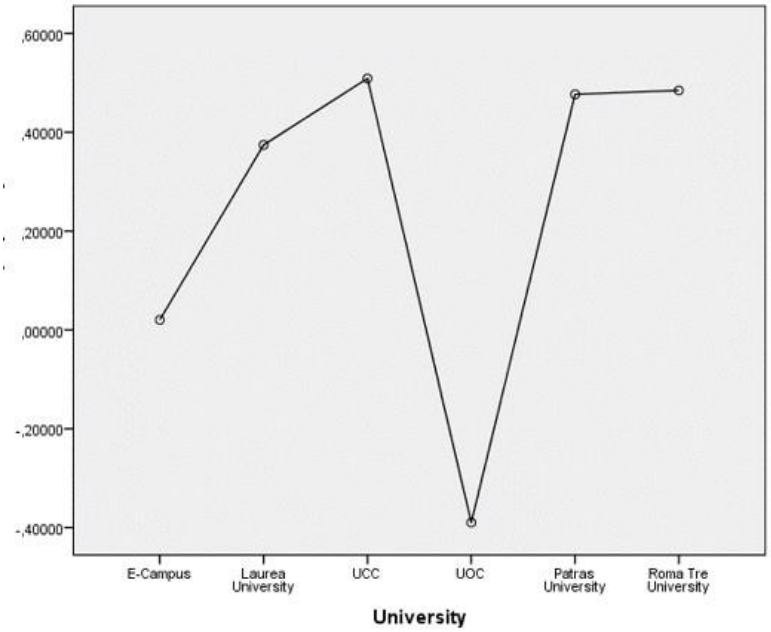
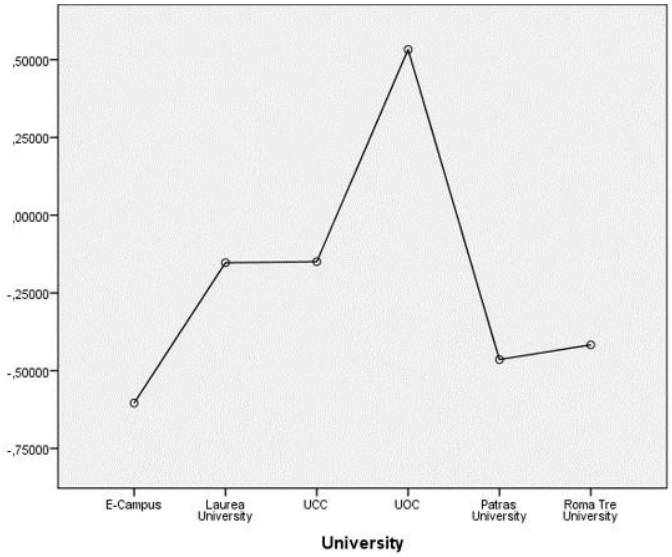


Figure 4: Employability vs Universities



Spanish, Irish, and Finnish students are the most caring to the relationship with peers, even if Spanish students stand out from all the others by showing a greater sensitivity to this aspect (Figure 5). Italians and Greeks seem to show less interest in this aspect. One possible explanation could be that these students take this for granted, just as Spanish students showed less interest in job placement in their questionnaire responses because they are probably working students.

Figure 5: Positive relations vs Universities



CONCLUSION

ECOLHE is a three-year project involving six partners from five European countries (Italy, Spain, Finland, Greece, Irelnd) characterized by a different digital development process and Digital Economy and Society Index (DESI) value. This work illustrates the results of an online survey involving 1148 students from online and traditional universities in the partner countries. The data was collected by means of a self-administered questionnaire aimed at investigating the elements deemed relevant for students' digital learning and training. The results of the multivariate analysis made it possible to identify five components characterizing digital maturity and seven digital learning styles. Finally, the comparison between the universities involved made it possible to understand the effect that teaching practices had on the perception of students in terms of effectiveness and efficiency. Some factors, such as DESI, starting time of country digital development, type of university, traditional or digital, type of faculty, natural science or human and social sciences, working student, seems to be associated with students' perception of the digital teaching and learning practices.

THE SYMBIOTIC LEARNING PARADIGM (SLP): A LEARNER-CENTRED CURRICULUM DESIGN APPROACH

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ABSTRACT

The Symbiotic Learning Paradigm (SLP) has developed from practice in the Centre for Adult Continuing Education at University College Cork (UCC). Central to this practice are the core concepts of 'Learner at the Centre' and 'Lifelong and Life-wide Learning.' SLP offers a curriculum design approach that is dynamic and adaptive for the rapidly changing and perpetually challenging world of twenty-first teaching and learning in higher education. It offers a new curriculum design lens that places the learner at the centre and focuses on the importance of collaborative co-designing relationships within and beyond the university as a means to achieve this. Life-wide learning recognises that people occupy different learning spaces (personal, professional, public, community) and the lifelong learning journey provides the learner with a variety of learning experiences (Jackson, 2012). SLP offers a flexible and reflexive approach to co-designing these varied learning experiences. As part of the Erasmus+ ECOLHE Project: Empowering Competencies in 'Onlife' Learning, SLP was piloted in six higher education contexts across Europe. Through this process SLP has been developed and refined as a model of best practice and as evidence-based critical reflection on practice to improve practice in higher education. Its process of inquiry into teaching and curriculum design as a 'practically oriented activity, conducted collegially' through the ECOLHE project has grounded it in the scholarship of teaching and learning (Prosser, 2008). Through the piloting process of the ECOLHE project we came to understand that the central tenet of the SLP approach to curriculum design is 'Learner at the Centre' and so this is the concept that we will discuss here in the ECOLHE final conference paper.

BACKGROUND

University College Cork (UCC) has been providing adult education-based courses since the early 1910's and the Centre for Adult Continuing Education (ACE) as an organisation has been operating since 1946. It began by providing a diploma in Social and Economic Science and it has grown to provide over 90 programmes ranging through social science; arts, culture and heritage; community, diversity and inclusion; business and coaching; health and wellbeing; education and learning and a wide range of cross-sector personal and professional development programmes delivered locally, nationally and online. Its purpose is to provide opportunities in lifelong learning within UCC for all adults irrespective of age and previous educational background. The Symbiotic Learning Paradigm emerged from ACE's practice of learner-centred and transformative lifelong and life-wide learning provision, and this has shaped our design choices through this research process. Curriculum design at ACE embraces all forms and types of learning. It is driven by learner interests, needs, and values - both professionally and personally - and this is why 'Learner at the Centre' is at the core of the holistic SLP approach. SLP was chosen as the name for this approach because 'symbiotic' denotes a mutually beneficial relationship between different people or groups, and collaborative co-design relationships are key to the success of the SLP approach. We chose 'learning' rather than 'teaching' to highlight the lifelong and life-wide

learning context of the approach and to centralise the 'learner' rather than the 'teacher' for twenty-first century teaching and learning. Finally, SLP is a 'paradigm' as it proposes a set of assumptions from which you can begin co-designing lifelong and life-wide learning curricula in higher education. SLP is not a framework, model, or method, it is a perspective that challenges traditional higher education curriculum design assumptions and opens curriculum design processes.

Coming from a constructivist approach to teaching and learning at ACE, SLP recognises the importance of the learner's prior knowledge, experiences and unique perspectives and aims to bring this not only into the learning environment but also into the design processes of curricula. For this to happen attention must be given to the processes of engagement with SLP to consider how this learner perspective is positioned in the dialogic space alongside the other 'professional' stakeholders. This is why a participatory and co-design approach is central to SLP. We acknowledge that this is an approach that will need to be worked towards in HEIs, but it is in the process of moving towards a participatory and co-design process that space and time is allocated to placing the learner at the centre of their learning. This is not an accomplished task at ACE but rather part of an ongoing process to centralise the learner in all processes.

ECOLHE PROJECT

The SLP approach was piloted through the ECOLHE project, and the research activities (Fig. 1) found SLP to be robust and flexible as our partners in each HEI context were able to engage with the process regardless of the stage of design of a programme. Our partner's universities largely provide traditional undergraduate and postgraduate degree programmes but in a variety of formats i.e. online, in-person, blended, asynchronous. We viewed the ECOLHE project as an important opportunity to critically explore implementing SLP in higher education contexts that differ to ACE. Flexibility within the design of SLP is important as the higher education sector is diverse and HEIs often act with a significant amount of autonomy within the sector and within the various colleges/schools of an individual HEI. The flexibility of SLP allows it to be used as a co-designing method in traditional higher education contexts as well as contexts with a focus on designing lifelong learning opportunities. Praxis in education research involves a deep exploration of pedagogical experiences and theory to critique practice (Arnold, Edwards, Hooley, & Williams, 2012) and for our output we challenged our partners to engage in this critical praxis at the design phase, through facilitated co-design workshops with learners and both internal and external stakeholders. We had a set of ten original elements (Version 1) that we considered central to the SLP approach and through the project we refined these based on the 'meaning making' of our partners' through their evaluations of engaging in the SLP process in their contexts (Version 2). We also facilitated workshops with our own staff for their reflective evaluations and feedback to further refine the approach, so it reflects their lifelong learning ethos, values and practices (Version 3). This last step was important as an aim of creating and refining the paradigm was to make explicit the implicit lifelong learning values and practices at ACE, to define clearly and concisely our processes so we can then open our processes of designing for lifelong learning in higher education to the wider sector. As part of the research activities for ECOLHE the project partners facilitated a reflective workshop to self-assess the piloting process using a set of qualitative indicators and the data they gathered in their reports was then analysed using reflexive thematic analysis (Braun & Clarke, 2022).

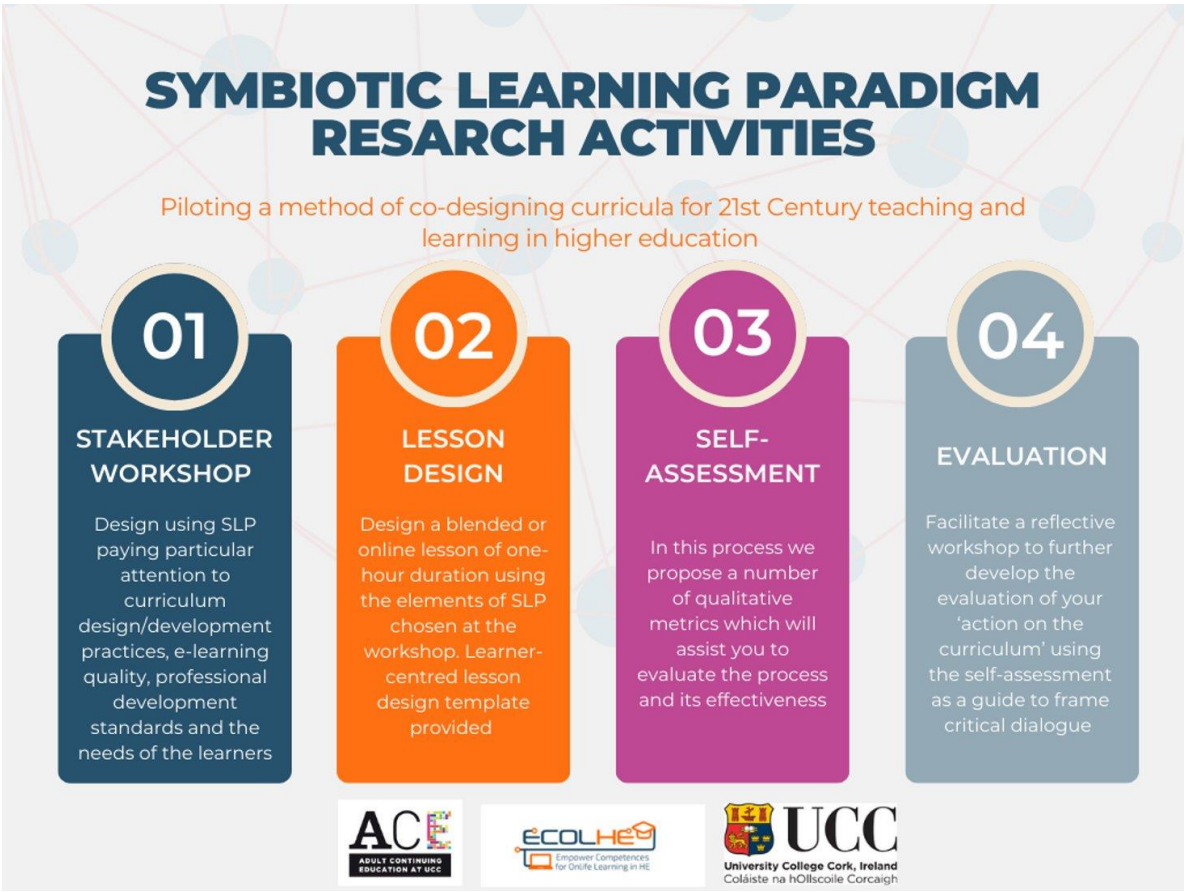

Fig. 1 Summary of the 104 – SLP Research Activities undertaken as part of ECOLHE

FINDINGS

From our piloting process we understand that the central concepts underpinning the SLP approach to curriculum design are 'Learner at the Centre' and 'Lifelong and Life-wide Learning.' Through the ECOLHE project the key elements of the approach have been refined – some of the original ones have been replaced, updated and/or re-worded – and we now have eight key elements to the paradigm. These are:

1) Collaborative Relationships
2) Tripartite Stakeholders: Learners, Externals & HEIs
3) Flexible, Accessible and Open
4) Reflective Education
5) Knowledge and Skill Adaptive
6) Transversal Competencies
7) Responsive to Unpredictable Futures
8) Reflexive Education

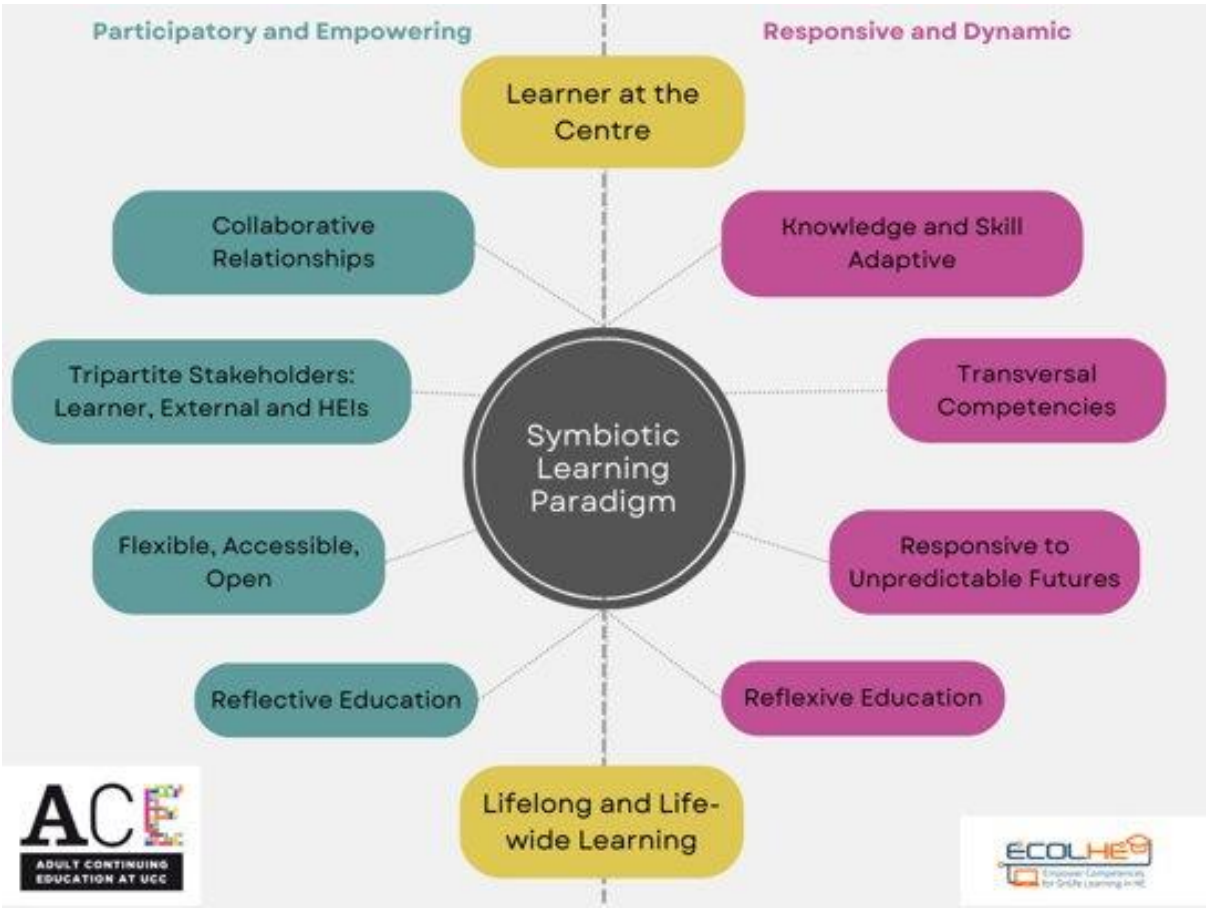

Fig. 2. Symbiotic Learning Paradigm – Themes, Concepts & Elements (Version 3)

These eight elements have been grouped into two themes that emerged 'Participatory & Empowering' and 'Responsive & Dynamic.' The qualitative indicators used to self-assess the SLP process during the research activities have also been refined based on the partner's evaluations and form part of the **Guide for Implementing SLP - part of the ECOLHE Research Output 104 Symbiotic Learning Paradigm and can be accessed from the ECOLHE Project website**. This guide is an open access resource for any higher education institutions wanting to use SLP as an innovative and piloted approach to designing lifelong learning curricula. Each partner when engaging with SLP added to our depth of understanding of it as a curriculum design approach. They used terms and concepts when writing up their reflections under the qualitative indicators, terms and concepts that we did not provide them with, but that emerged for them as important through engaging with SLP in their contexts. These are provided in the summary table here (Fig. 3) and we have used them to refine the design of the SLP approach. We are very grateful to our ECOLHE partners for sharing their valuable insights through their thoughtful and authentic engagement with the SLP approach.

ECOLHE Partner University	Key terms
Universitat Oberta de Catalunya (UOC)	Participation, empowerment, learners as stakeholders
Roma Tre University (RTR)	Learning to learn, transformative learning, sustainable approach, bottom-up process
Laurea University of Applied Sciences (LAU)	Valuing time for reflective discussion, clear frameworks, good facilitation
University of Patras (UPAT)	Strengthening the connection between HEIs, Market needs and Learners needs
Link Campus University (LCU)	Role of instructional designer, peer exchange
Adult Continuing Education (ACE)	Evolution of courses, learners as curriculum designers

Fig. 3. Table of key terms that emerged from the analysis of the ECOLHE partners' evaluative reports

In the continuing spirit of collaboration and co-design the above key terms are referenced in the developed conceptual understanding of SLP discussed throughout our chapter in the final project publication which is available on the ECOLHE website. For example, two terms that were central to the reflective discussion by UOC on their engagement with SLP were 'participation' and 'empowerment' and were mentioned by other participants also. However, taken in isolation they lose the depth of meaning attributed to them by our UOC partners in this extract:

"What enables inclusion is not only the SLP methodology itself, but **the decision to apply a model of participation and empowerment**. Therein lies the fundamental point. Obviously, a well-structured and clearly guided model helps to adequately apply the process, but **the initial decision has the power to change** the course design. The guidelines and structure of the model are essential to ensure the success of all the design process. And when **the disruptive vision of this process** is implemented, it is essential to guarantee its success, because **failure can promote a negative perception of stakeholders' active participation** in the curriculum design" (UOC).

Also, the meaningful insights from our UOC partners highlight the historic origins of ACE's practice, an Irish adult education practice borne from the community development principles of 'participation' and 'empowerment,' and positions SLP as a contemporary means to embed these principles in the design of higher education curricula (Ledwith, M. 2016). As highlighted by our UOC colleagues, it is the consistency of commitment to the approach from the outset that is the key to creating meaningful and authentic lifelong and life-wide learning opportunities in higher education. They also offer us a sound warning on the necessary commitment to the process to increase empowering participation in authentically collaborative relationships and we have heeded it and worked to develop a user guide that embeds these in the process. Keeping the learner at the centre of higher education processes requires us to design collaborative approaches that increase learner participation in all aspects of their learning and supports their empowerment to do so authentically.

LEARNER AT THE CENTRE

SLP challenges us to engage in a curriculum design approach that necessitates continually re-centralising the learner. Putting the learner at the centre is a constant challenge in curriculum design as it breaks from the traditional content-centred design approach that we are all familiar with. We need to challenge ourselves and our processes, critically reflect on each process to push the changes that are necessary to put the learner at the centre in any authentically humanistic way. The conditions for learner engagement in higher education processes require the HEI to be experienced as 'a site of democratic citizenship, as a learning community and as a critical institution' (HEA, 2016). SLP fosters debate and

enables learner participation in decision-making structures and processes. If genuine learner engagement is to happen then the learners need to feel a certain degree of 'loyalty' to the HEI and so the SLP workshops need to be facilitated as communities of practice to generate a sense of belonging (Lave and Wenger, 1991). HEIs are central to a culture of challenge and critical thinking and so we begin the SLP approach by honestly challenging our higher education culture and questioning our own assumptions so we can facilitate a more democratic and socially safe space of collaboration and co-design. As students 'need support in developing not only knowledge and skills but also attitudes and values, which can guide them towards ethical and responsible actions' (OECD, 2019), teaching staff need a more collaborative approach to designing and developing the curricula that can support the development of these attributes.

Through the piloting process of ECOLHE we have learned that SLP needs to be used regularly and utilised at all official times of curriculum design and development to keep the learner central. In the current system of higher education, curriculum design processes can often position the higher education staff as experts who consult with stakeholders, and learners can then subsequently be positioned as 'service users' who provide feedback (often with low response rates) on their learning experiences. SLP pushes us to challenge ourselves and our systems, to critically examine our processes, to be less paternalistic towards learners, and to actively collaborate with them in the decision-making processes of curriculum design. Freirean emancipatory education principles inform ACE's humanistic approach yet the formal systems in higher education do not always seamlessly match with this ethos, and we propose SLP as a way to bring adult education and lifelong learning principles directly into the higher education curriculum design process.

CONCLUSION

Through the ECOLHE project we have deepened our understanding of the central role of the learners to the approach. SLP is a participatory approach to curriculum design with the inclusion of learners as stakeholders in the design of their own curricula - not learners **and** stakeholders but learners **as** stakeholders. Through ECOLHE we know that engaging with SLP is a reflective process and it can be used effectively at any stage of the curriculum design process. It is a holistic approach that opens the university curriculum design processes to learners and external stakeholders. Centralising the learner in the curriculum design process requires a reflective approach that questions traditional HEI assumptions about their role and the learner's role in curriculum design. The collaborative relationships and processes of SLP need to be authentically designed and reflectively maintained if it is to be sustainable. The ECLOHE project allowed us to refine our curriculum design approach and we are very grateful for the efforts of our partners who engaged so authentically and meaningfully with the process in their own higher education contexts. The ECOLHE project allowed us to gain a much deeper understanding of SLP and we have made refining design changes in response to this. SLP has emerged from a unique teaching and learning space and is intended for use by institutions wanting to design curricula that provide lifelong and life-wide learning opportunities in higher education.

BIBLIOGRAPHY

Arnold, J., Edwards, T., Hooley, N. & Williams, J. (2012) Conceptualising teacher education and research as 'critical praxis', Critical Studies in Education, 53:3, 281-295. Available at: https://doi.org/10.1080/17508487.2012.703140

Barnett, R. (2011) Lifewide education: A new and transformative concept for higher education. Learning for a complex world: A lifewide concept of learning, education and personal development, 22-38.

Braun, V. & Clarke, V. (2022) *Thematic Analysis: A Practical Guide*. London: Sage Publications Ltd.

Cowan, J. (2011) Freedom to learn: a radically revised pedagogy to facilitate lifewide learning in the academic curriculum. Learning for a Complex World: A Lifewide Concept of Learning, Education and Personal Development, 122.

Fleming, T. (2020) Models of Lifelong Learning: An Overview. In M. London (Ed.), *The Oxford Handbook of Lifelong Learning*, 2nd Edition, Oxford University Press (pp. 1-26). Available at: https://doi.org/10.1093/oxfordhb/9780197506707.013.3

Jackson, N. J. (2012) CHAPTER A1 Lifewide Learning: History of an idea. Lifewide Learning, Education & Personal Development e-book, 1-30.

Illeris, K. (2017) Peter Jarvis and the understanding of adult learning, International Journal of Lifelong Education, 36(1-2), 35-44. Available at: https://doi.org/10.1080/02601370.2016.1252226

Lave, J. & Wenger, E. (1991) *Situated Learning*. Legitimate peripheral participation. Cambridge: University of Cambridge Press.

Ledwith, M. (2016) *Community Development in Action: Putting Freire into Practice*. Bristol University Press.

Nussbaum, M. (2009) Creating Capabilities: The Human Development Approach and Its Implementation. Hypatia, Vol. 24, No. 3, Transgender Studies and Feminism: Theory, Politics, and Gendered Realities (Summer, 2009), pp. 211-215. Available at: https://www.jstor.org/stable/20618174

OECD (2019) OECD Future of Education and Skills 2030 Conceptual learning framework: Attitudes and values for 2030. Available at: https://www.oecd.org/education/2030-project/teaching-and-learning/learning/attitudes-and-values/Attitudes_and_Values_for_2030_concept_note.pdf

Prosser, M. (2008) The Scholarship of Teaching and Learning: What is it? A Personal View. International Journal for the Scholarship of Teaching and Learning: Vol. 2: No. 2, Article 2. Available at: https://doi.org/10.20429/ijsotl.2008.020202

THE DIGITAL INVESTING IN EDUCATION

A CHANGE THAT STARTS FROM THE FUTURE TO RETURN TO THE PAST.

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ABSTRACT

Digital today is present in every context and has increased its opportunities for use and at the same time the risks of speculation and unethical uses.
This research work will deal with educational actions in the digital age with the aim of analyzing three virtuous cases that have worked in the educational field, highlighting the potential and possible critical issues in order to transfer know-how for future projects.
The analysis methodology used is of a qualitative nature through a mix of data collection tools, first of all a participating observation made in the first case study. Then you will apply a content analysis for the second observed case and finally you will conduct an interview with the organizer of the last examined educational project. Therefore, based on the Grounded Theory we will start from an empirical analysis of the data to arrive at conclusions and theories in view of the implementation of these particular models in other areas.
Starting from the reflections of sociologists Franco Ferrarotti and Vanni Codeluppi, who frame the problem related to education above all by observing the digital context and the changes it brings, we will analyze empirically some virtuous models that use digital not only as a technological support, but as an ontological concept on which to base their innovative educational offerings.
Specifically, we will observe the hybrid teaching methods used at the Talent Garden Innovation School, which offers digital professional teachers experts in the labor market.
The second case analyses the innovative Treccani Scuola platform: a perfect example of a combination of innovation and tradition.
Finally, the project Ma.L.L. Mo at the Heracle UniCusano Lab, a project that studies predictive models of learning motivation through algorithms of machine learning (AI), will be analyzed.
Lastly a particular focus on the Ma.L.L. Mo at the Heracle UniCusano Lab a project that studies predictive models of learning motivation through machine learning algorithms (AI) and finally in the international context it will observe the Mit open courses and the TED platform that that distribute knowledge at high levels for free.
The hope of this analysis is to be able to take interesting ideas to strengthen research in the field of digital education and put the ethical question of technological instrumentation at the center.

Keywords: digital work, social media, education, media education, ethics, infosphere.

1. INTRODUCTION AND THEORETICAL FRAMEWORK

Today's world seems to deny traditional values and reduce them to a mere technical factor, it is a question of living in a hyperproductivistic and chronophatic way. The speech is emptied and made insignificant because of the large amount of information, no longer logically mastered, but deforming and phagocytic. The fact that ethical questions are put on the same level as aesthetic appearances and

consistency is exchanged with stubbornness no wonder and makes the research must find tools to stop this rapid rise of the irrational to the benefit of judgment critical and modulated. Among the various paths to be taken certainly that related to digital education must be pursued with force and probed in all its most relevant parts.

Si dice che i bambini e gli adolescenti di oggi, perdutamente innamorati dello schermo e abilissimi nel ciccare Internet, siano più intelligenti, più informati di quelli di ieri. Può essere vero. Ma di quale intelligenza, di quali informazioni si tratta? Se non già oggi, quasi certamente domani, saremo probabilmente messi di fronte ad un popolo di informatissimi idioti, se è vera la definizione dell'idiota come di colui qui sait tout et ne comprend rien. (Franco Ferrarotti 2019: 109).

It is said that today's children and adolescents, who are madly in love with the screen and are very skilled at taking advantage of the Internet, are smarter, more informed than yesterday's ones. That may be true. But what intelligence, what information is that? If not already today, almost certainly tomorrow, we will probably be faced with a people of highly informed idiots, if it is true the definition of the idiot as the one who sait tout et comprend ne rien. (Franco Ferrarotti 2019: 109, Tran. Eng).

Many have found an atrophy of the imagination that therefore reduces the habit of reading, while increases correspondingly the satisfaction induced by the contemplation of images. Experts say that we are faced with a new form of illiteracy that leads us to prefer the acquisition of knowledge through images.

Knowledge should not be confused with a sum of information, any knowledge of reality necessarily refers to a theoretical-conceptual apparatus that is the pivot to the reality of the world at the very moment when it is explored. Today, according to Innis, the human being is in the fourth phase of transformation and social organization, dominated by the two imperial systems, American and Soviet, linked to the use of electricity, electronics and oil. Yet new users have an escape from the power of the mass media and is called according to Lazarsfeld "small informal group" within which develops the concrete daily life of the individual and which plays a decisive function with regard to acceptance, refusal or indifference to media messages (Franco Ferrarotti: 2019: 187).

Certainly nowadays the immediate usefulness and the massification of profit are hindering all those activities not directly utilitarian as the tradition, the custom, the conviviality, the pure taste of being together. We must therefore remember that the spectator being disposes to passive participation, becomes the antechamber of mental passivity and political inertia. It almost seems that one is impersonally experienced by other systems and other superstructures.

The educational system that schools offer is based on the assumption that children should learn by providing them with basic skills such as writing, reading, accounting and other such as geography, history and literature. A current of pedagogical thinking states that strengthening the child's thinking ability should be the main task of the school, in order to promote the ability to reason and judgment.

Initially being educated was compared to acquiring information, today it is not only about this but there is a phase that sees critical reflection at the center of thought and a development of the creative component of it that pushes students to employ an imaginative thought; there is also a value and ethical component that must not be neglected.

The school represents the means through which past and present generations try to give an imprint to the future. If today goods have progressively enriched their meaning with a symbolic and communicative value as well as material, the school must be the instrument that makes us reflect on the true meaning of things and reality in order not to lose sight of the true meaning of life. Students must be treated reasonably so that they become more reasonable human beings.

The child in the early years is faced with a problematic world, everything invites to be investigated and examined thoughtfully, it is a world that stimulates thought, incites action and causes amazement, a world that marvels. In the school environment, however, we are faced with structures and superstructures, and the natural mystery of the domestic and family environment is replaced by stability and conformity in which everything is regular and explicit.
The child comes to miss the pleasure of discovery and it is therefore necessary to encourage both organization and creativity, to create the conditions capable of leading curiosity, establishing connections and promoting the course of suggestion.

The new educational objective to be pursued must be the acquisition of the ability to understand and to "judge well" and the fundamental part of the educational process must be the understanding of the internal and reciprocal relations between the subjects.
It is the analysis of problems that generates interest and motivation in order to create independent, imaginative and ingenious thinking as stated by John Dewey (Lipman, 2003: 30).

The purpose of this educational revolution is to be able to speak of a class as a research community in which students listen with respect to the ideas of others, can integrate them, ask them to give reasons in support of their opinions and help each other to draw conclusions, so this is a mature and responsible system.

Today it has added a time made possible by the Internet, instant that requires individuals to be always active and connected, in the same way that the world of consumption requires to be always ready and available to commercial novelties. The human mind, however, has not evolved as fast as the economic and cultural system; in an age in which hyper-communication and technologies capable of simple life dominate, the brain takes on a determining role and is continuously stressed and often used even beyond its capabilities.

Human beings are experiencing, according to James Lull, a culture that wants to overcome the communicative limitation of the written word and oral speech, adopting languages symbolically richer, less analytical and based on the emotions given by images and music (James Lull, 2000: 120). To count only the novelties of the stimulus produced, the one that I categorize as the "slavish difference" and eccentricity. There is therefore a continuous search for the new, variety and excess. What is fed by the media is continually combined with what is directly experienced by individuals, without the latter having the time to elaborate the necessary distinctions and their semantic contributions. It is here that media education and the new digital edu-platform must enter and find its investigative and decisive dimension to guide man in the right experiential direction. Let us always remember that, despite the fact that the world today stands on financial markets and the economy, the economic sphere necessarily needs the cultural sphere, which is capable of creating a reliable environment where trade can take place.

2. METHODS AND METHODOLOGY

For this analysis work, it was decided to use a qualitative methodology in order to investigate in depth some salient aspects of digital education present in the main study platforms. The qualitative methodology used is based on the Grounded Theory that sets out to discover or construct theory from data, systematically obtained and analyzed using comparative analysis. Some of the most significant examples of digital education will be analyzed using the method of content analysis, participatory observation and a final interview in depth.

The whole analysis will be carried out from a sociological point of view with the main purpose of investigating and providing insight into how human into how human society functions in relation to digital education.

The choice of conducting empirical research on three case studies is based on the objective of revealing the existence of virtuous models to be emulated or improved.

In the first instance, consideration was given to the need to get to the heart of the online educational mechanism that, thanks to the participant observation technique, was analysed in detail and discussed concretely with the participants. A continuous exchange of opinions and points of view allowed the visualization of the phenomenon in many aspects that would not have emerged by performing a simple questionnaire. Often the quantitative methodology is not the best option to pursue as it leaves uncovered the emotional and character peculiarities of the more human reality that, in this precise context, had to be investigated in depth in order to understand what were the best aspects for the their training on the web.

The analysis of the first case study will therefore focus on the observation from within a Digital Marketing course held between April and July 2020 at the Talent Garden Innovation School, a digital training institute that provided courses both in presence and at a distance, but that for the problems caused by the epidemic was entirely provided online.

For the entire analysis process, a precise analysis of the content has been carried out, which has made it possible to find the most relevant details of each case study under consideration. In particular, for the Treccani Scuola platform, we went to see which themes and which service techniques are used to show the various educational contents. Therefore, based on the Grounded Theory we will start from an empirical analysis of the data to arrive at conclusions and theories in view of the implementation of these particular models in other areas.

Starting from the reflections of sociologists Franco Ferrarotti and Vanni Codeluppi, who frame the problem related to education above all by observing the digital context and the changes it brings, it will be emphasized some virtuous models that use digital not only as a technological support, but as an ontological concept on which to base their innovative educational offerings.
Therefore to summarize the observation of the hybrid teaching methods used at the Talent Garden Innovation School, which offers digital professional teachers experts in the labor market; The Treccani Scuola platform: a perfect example of a combination of innovation and tradition; ultimately the present research will end with a particular focus on Ma.L.L. Mo at the Heracle UniCusano Lab, a project that studies predictive models of learning motivation through algorithms of machine learning (AI). An in-depth interview will be conducted with one of the project's collaborators to highlight the innovations from the educational and organizational point of view. A last focus to open the horizons towards an international panorama it will on the work of Massachusetts Institute of Technology (MIT) and the TED Talks that for years has been providing free courses on digital platform proposing innovative themes that students can spend on the job market.

The comparative analysis of these various models of digital teaching at high levels allows to understand strengths and gaps and lays the foundations for developing new models of pedagogical growth.

The research objective is to describe and to provide, through a qualitative empirical analysis, a detailed account and reporting of the characteristics of this digital education systems, including establishing regularities in this models in order to assess social impacts and identify the likely social and cultural consequences of a planned technological project.

3. CASE STUDIES.

Talent Garden Innovation Schools - Treccani Scuola - Ma.L.L. Mo - MIT.
The way we learn, communicate, work and interact, socialize, have fun, play and care has been completely revolutionized by the arrival of digital technologies; these have offered us the opportunity to do more at the same time, become so multitasking and to be present in several places simultaneously,

what is called telepresence, thus transforming the nature and the conception we had in the past of temporality and spatiality.

These initial considerations are useful to understand that we live in a new environment, which Luciano Floridi defined *infosphere*, a space that is increasingly made in function of the ICT and IOT to allow them to interact and meet our needs. Think for example of the fact that we are rebuilding cities and the road fabric for autonomous cars and not vice versa; our habitat is becoming more and more robot-friendly and less and less human-friendly (Floridi, 2020: 15).

It is necessary to dwell still to investigate in depth the current context and keep in mind that technological changes have lived three periods sanctioned by three types of philosophies: the philosophy of programming, the philosophy of automation and the philosophy of simulation. During a lecture organized by Treccani Futura, Cosimo Accoto talks about software code and how this marks the change of civilization; initially man was part of an oral civilization, of a civilization of writing and printing and then finally arrive at the so-called civilization of programming. All technological devices today live and work because inside there is a software code that presents an executable language, that is, it does what it says. Today the language of machines is not interpreted, it is executed because it is a formal structure made of instructions and commands; moreover the software code that you are writing is able to perceive the world and living beings: it is sentient.

The challenge for the future of man is to increase our distinctive ability to reason critically and apply more consciousness, more judgment and more creativity, what robots are not yet able to do.

In the new age of technology and digital, men become more and more officers of apparatuses and the identity of the individual is assigned by the apparatus in which the same is inserted, thus shifting the identity more and more towards the role.

Digital technology therefore becomes a structure that is an integral part of public and private life; today it is in fact used in every sector, from the financial sector to the health sector, up to the clerical and school life. Every human being has called for the use of technology to speed up processes and simplify procedures, but the question remains what the disadvantages of this progress may be. Does technology really simplify people's lives? It happens sometimes that instead complicates it and creates potential dangers or unsurpassed difficulties; just think of the news of Stefan Thomas, a German programmer living in San Francisco who risked losing $220 million in bitcoin because he couldn't remember the password to access his cryptocurrency wallet.

Personal information plays a fundamental role in who I am and who I can become. It is necessary to call into play a philosophical understanding of human nature that is adequate in the digital age and in our information societies.

It is in fact with the arrival of social networks that have developed "boxes" information built in the image and likeness of customers and only by promoting a more open comparison and a higher quality of information that can improve the social context starting from investing in education.

How is it possible to decline the digital in the various educational contexts in the best way?
A reading was given by the journalist and writer Gianluigi Nuzzi during his speech on the platform Treccani Futura who insisted on promoting a school course of media interpretation. Every young person must be able to relativize and listen to what he is hearing or seeing.

Today there is a cultural decline determined by the inability to give value to knowledge as a matrix of problem solving, so Giovanni Floris observed. The characteristics of immediacy and simplification typical of digital are declined in any context and also for what concerns the choice of politicians is more a representation of empathy and not the ability to solve problems. «We are fascinated by those who complain about the same things we complain about, just in line with the logic of likes of social networks, we follow and like only those who confirm our thinking».

The only structure that can restore a coherent and objective vision of the world, which can increase a critical consciousness, is the school that is, even today, the only effective network of the country. We guarantee the whole country's contact with culture, but we don't give it the importance it has. With what rules and principles should we conceive the use of digital? Prometheus said, quoted in many speeches by Umberto Galimberti «technique is far weaker than the laws that govern nature». Nature, for the philosopher, is the background to refer to in order to live with new digital technologies. Today we inhabit the technique and look at the universe only from the point of view of utility, but we must stop verifying the truth only on the basis of effectiveness.

So how can the school educate the soul in the digital age? The answer is: going to incentivize what resides within man, emotions and morality. The ethical question must therefore be the pivot on which all the adoption of technology revolves.

Any activity today is rationally ordered in terms of efficiency and productivity. According to Galimberti, adults no longer have an alternative to technical thinking, people have become accustomed to thinking binary "yes" and "no", everything passing in the middle is excluded and children are increasingly affected by this mentality. It was thanks to the use of divergent thinking that solutions were found by reversing the problem and this was stimulated first of all by the schools where at the base there was the difference between education, that is, the passage of cognitive contents, and education, care of the emotional and sentimental path of students. The technological context is almost irreversibly reducing this difference, making schools increasingly incapable of educating; because it is thanks to emotion, the emotional resonance, that every child feels the weight of their words and behaviors (Umberto Galimberti, 2021, p.98).

In today's world, in many situations, there is no emotional resonance of the gravity of one's gesture. This is because, still according to the psychologist, it is necessary to leave in the first three years of life to manage the formation of emotional maps.

Man has no feelings but emotions, as feelings are cultural phenomena; feelings are learned, all primitive tribes have myths and stories to teach what is pure and what is impure, what is good and what is bad, right or unjust. Literature is the unique and indispensable repertoire from which to draw and learn feelings. The school first understands the importance of literature, the sooner it will be able to train the young of the technological future who can dispose of emotions and feelings to face life in a *phygital* environment.

So how does digital fit into the various educational contexts? I bring here an example that I had the opportunity to analyze and live concretely: Talent Garden Innovation School a model of education that sees Davide Dattoli creator of a real digital school that counts thousands of students around the world. He has made digital materials the leverage to create new skills and inject them directly into the world of work, the study plan includes lectures in presence or an entire online teaching that uses tools and platforms such as Miro, Google Drive, Canva, Facebook Business Manager to work together in the creation of projects and the analysis of results. The experience of this new teaching puts the practice first and grants maximum freedom of expression to students who can measure their creative and cognitive abilities.

The difference that emerges from Talent Garden is the choice to bring into the classroom teachers who are first of all digital professionals, work for corporates and have field experience of what the market and society requires. An attentive, participatory, almost "ethnographic" gaze that gives students an effective concreteness.

School data shows that almost everyone at the end of the course has the opportunity to join a digital team where they can spend the new knowledge acquired. It is not just a matter of understanding the importance of the direction the world is taking, but it is primarily a matter of teaching new students/users the advantages that digital can offer them both in economic and experiential terms; Moreover, by touching the ICT, students have the opportunity to understand how these can become potentially

dangerous and harmful for their interlocutors. Talent Garden is primarily a place of relationship and meetings between people who want to work with the future, but who can not forget that they are working especially for the future.

The period in which the online educational mechanisms of Talent Garden have been observed is from April to July 2020; from the beginning there is an atmosphere of confidence and serenity, every student has the opportunity to present himself and everyone is asked what his super power is, that is, his greatest ability. There is a first obvious enhancement of individual abilities that can be put at the service of others. Taking into account the aptitudes of the individual allows to modulate the subsequent requests for the tasks to be performed.

The educational strategy adopted involves the creation of small classes, a maximum of 25 participants are invited to collaborate in groups of up to 5 people. The communication platforms on the web allow in this case to strengthen ties and create perhaps a stronger union because to bridge the physical distance increase the chances and opportunities of contact thanks to the phenomenon of telepresence that electronic devices and digital allow. It creates a continuous exchange of ideas, reflexive ideas almost 24 hours on 24 because this possibility of being continuously connected increases the opportunities for comparison.

Another significant benefit of this type of online teaching mechanism is the learning of the use of new digital platforms, useful for cooperation and telework, were in fact used graphics and brainstorming platforms such as Canva and Miro, file sharing platforms such as Google Drive, video calling platforms such as Google Meet or Zoom and finally also platforms for work planning and deadlines such as Trello. It is therefore a whole series of instruments which would have been almost superfluous in the present situation but which at a distance have proved to be very useful and effective from the point of view of group work management.

A new method of work that can be spent in the company in the future has been learned, a method that involves working for goals, obtaining rewards and returns thanks to a mechanism of personal satisfaction that becomes an incentive to do more and better. A didactic therefore that incites the individual to become autonomous and to follow his own style.

The distance learning experience ends with the opportunity to conduct a day of interviews and get to know the managers and human resources managers of large multinational companies, which thanks to technology has been easier to achieve. The opportunity has therefore been created for each student to establish links and expand their network of contacts.

The sentiment of the class has always been very positive and the knowledge acquired has also proved useful in the workplace, being online has stimulated offline meetings for the curiosity to get to know each other and to organize face-to-face meetings.

Another type of educational experience that treats digital as its support and not just as an activity to be countered is the case of the Treccani Scuola platform, which provides two types of products: on the one hand interactive teaching, and on the other of the Treccani lessons with guests of great cultural and political importance. The offer is aimed at students, but also teachers, who have the opportunity to enter a club where interventions and practical advice are spread to better experience the world of school. The topics addressed are of various types and range from literature, science, economics, philosophy, but do not forget the new digital context in which they are inserted. In fact, there is no lack of a reference to technologies and the way to use them in a conscious way; Treccani, thanks to its interest in exploiting the potential of new media, becomes an example of value that combines culture and culture of digital novelties.

The frequency of the courses also provides for the issuance of a certificate that certifies the presence and participation, it is a pdf to be printed and have physically with you to give a physical trace of a virtual experience.

The mechanism implemented by the digital platform adopts a user retention process that receives email reminders of future events and lessons, therefore feeds a type of education that uses marketing ploys to increase views and clicks. In addition, online participation allows you to use the chat during educational meetings and be able to ask questions to guests, characters of a certain caliber with which it is usually rare to be able to get in touch. This increases the curiosity and reputation of the platform, encouraging the creation of virtuous communities linked to the desire to learn and know.

From this, therefore, we deduce that many educational contexts are taking into account the impact that digital has on education and try to exploit it in a positive perspective that takes into account the simplicity but also the effectiveness and immediacy with which the various contents can be vehicled. However, it remains to be understood how these are received by the students, since the almost maternal physical contact that is established in a space with the teacher in three dimensions is certainly more meaningful and more incisive. In Massimo Recalcati's book *L'ora di lezione. For an erotic teaching*, this is precisely what we are talking about and it is shown how important it is to «achieve maximum closeness with the body of the teacher to absorb all knowledge» (Massimo Recalcati 2014, p. 39).

We must be cautious and thoroughly analyze the prevailing contemporary model of a satisfying drive that seems to burn every difference between absence and presence. This is what Recalcati defines as the «cult of the immediate enjoyment of the Thing» that excludes the possibility of the encounter with the Other and carries out a certain independence in the the formation that becomes a continuum of the individualistic mentality born with capitalist society.

In the investigation carried out by Milena Gabanelli and Francesco Tortora on *Il Corriere* emerges the guidelines that provide for the prohibition for children from zero to two years of standing in front of a screen, from two to four years must never spend more than an hour a day passively watching tv or mobile phones, tablets. From 6 to 10 years the critical threshold stops at two hours. The time spent in front of the screen can harm children and indicates correlations with overweight, obesity, problems of motor and cognitive development and psycho-social health. In addition, excessive exposure to devices risks damaging the ability to express emotions and communicate effectively.

There is one datum that seems to discourage the idea of progress towards digitalization and it is precisely the one about schools. In America, public institutions that house children from the middle and lower classes are becoming more and more digitized, but in Silicon Valley and other areas inhabited by technology managers are increasingly popular Waldorf Schools that promote the educational approach developed since 1919 by Rudolf Steiner: learning through recreational and practical activities.

Con la premessa che ci viene da questi dati si prendano ora in considerazione due esempi internazionali di didattica online, la prima è quella utilizzata dal Massachusetts Institute of Technology (MIT): a technology institute considered one of the best in the field of education to be ranked as the second best school in the world in 2021; la seconda è una forma educativa che vede nel talk uno strumento necessario a fornire conoscenza, i TED Talks che, oltre a essere momenti di scambio motivazionale, appaiono come eventi che si servono di tecniche televisive e di show entertainment per trasmettere informazioni circa determinate tematiche.
With the premise that comes from these data it now considers two international examples of online teaching, the first is that used by the Massachusetts Institute of Technology (MIT): a technology institute considered one of the best in the field of education to be ranked as the second best school in the world in 2021; the second is an educational form that sees in the talk a necessary tool to provide knowledge, The Ted Talks that, in addition to being moments of motivational exchange, appear as events that use television techniques and show entertainment to convey information about certain topics.

A few years ago, the American university announced the MITx program to attend free courses through an open-source platform, accessible via the Web to all students in the world. Anyone can audit an interactive course through the OpenCourseWare e-learning platform that includes lectures, online workshops, self-evaluation tests and discussions between students. This type of project is embodied as one of the most human projects of MIT as it has been realized that there is much untapped potential that

is lost for the development of human society because of the impossible financial support to obtain the required training. One would feel with the location of the institution, along with the price of admission and study, plus an acceptance rate that is only 7.3%, MIT would be one of the least accessible institutions in the world. But on the contrary, MIT has been aware of facilitating accessibility for students and prospective students by staying true to its slogan "the soul of MIT is research" by digging into ways through which a wider range of people can be educated.

The university co-founded Edx with Harvard University in the year 2012. Edx is a non-profit educational platform that currently offers students more than 200+ courses that are free for audit. In addition to this, MIT has made a habit of publishing free of charge on the Internet all the teaching materials of its undergraduate and postgraduate courses since 2001. The more than 2,000 of these free MIT online courses are easily accessible to anyone with an Internet connection and Internet-enabled devices through the MIT OpenCourseWare platform. Edx is a tool to study any of MIT's free online courses within which you can live a more traditional classroom experience that includes video lessons, community involvement in discussion forums and assessed assignments (for those who opt for the paid version) and a certificate of completion that can be shared on social platforms such as LinkedIn or more traditionally on their Curriculum Vitae. Among the various courses proposed are, for example, machine Learning with Python: from linear models to Deep Learning that offers an in-depth introduction to the field of machine learning.

There is no lack of anthropological and sociological insights for example the course of Global Africa: Creative Cultures that shows students the opportunity to learn more about the material and visual culture of Africa. Additionally, students have the opportunity to learn more and examine how the continent's literary, musical, and artistic productions intersect with global politics.

Arts, crafts, science is another among MIT's free online courses where, through historical, theoretical and anthropological visions, they study the development, consumption, marketing and the value of craftsmanship in the past and present with the ultimate purpose of building and explaining personal critical thoughts on craftsmanship using the techniques investigated.

Research the link between new technology, work and society to establish action plans to improve the workforce are the topics covered by the course entitled "Shaping the work of the future". Students will explore how civic institutions can leverage the benefits of new technologies to enhance equal opportunities, Social inclusion and shared prosperity by addressing class issues from a historical perspective of labor and employment policy in the United States and around the world. Another interesting element addressed in this teaching portrays the tools for academic engagement in public policies and takes into account that the latter are becoming more complicated and technological and scientists and engineers must collaborate with the policy makers to provide scientifically sound answers to public issues. In short, a large number of courses and insights that the new technology makes possible the use. In a plurinformational context it is necessary to know how to find the right channels on which to inquire and certainly many of the courses provided by MIT reach a very high scientific level and quality.

The second example that was mentioned earlier concerns the TED Talks phenomenon. According to an educational neuroscience scholar there is no learning without emotion, there is need emotion to acquire new knowledge, to retain that new knowledge and focus attention. It now knows that positive emotions are related to association memory.

Recent research in neuroscience tells that the emotions are contagious, mirror neurons are in fact responsible for the empathy and happiness that the human beings feel when they see another individual experiencing those same feelings. This is the concept behind the TED philosophy with the mission to discover and spread ideas that spark imagination, embrace possibility and catalyze impact. The organization is devoted to curiosity, reason, wonder and the pursuit of knowledge, they welcome people from every discipline and culture who seek a deeper understanding of the world and connection with others, and they invite everyone to engage with ideas and activate them in your community. TED began

in 1984 as a conference where Technology, Entertainment and Design converged, but today it spans a multitude of worldwide communities and initiatives exploring everything from science and business to education, arts and global issues. In addition to the hundreds of TED Talks published on TED.com, they produce original podcasts, short video series, animated TED-Ed lessons and TV programs that are translated into more than 100 languages and distributed via partnerships around the world.

The education platform is based on watch-video lessons organized by subject and age, lessons collection organized by theme, interactive experience created with other organizations. Moreover you can create and build your own video-based lesson and partecipate to students and educators talk. Each year, more than 3,000 independently run TEDx events bring people together to share ideas and bridge divides in communities on every continent. Through the Audacious Project, TED has helped catalyze more than $3 billion in funding for projects that seek to make the world more beautiful, sustainable and just. In 2020, TED launched Countdown, an initiative to accelerate solutions to the climate crisis and mobilize a movement for a net-zero future.

It is worth recalling that TED is owned by a nonprofit, nonpartisan foundation.
To close the analysis framework, it was decided to do a further study on a type of education that uses new artificial intelligence technologies to improve the quality of teaching and investigate the best techniques to convey the teachings. The principle is to evaluate the student's learning methods and the internal dynamics of individual students in order to propose the best educational solutions. Technology is here at the service of the human being, first by discovering it and then by helping it. This is the research project M.L.L.Mo that is carried out at H.E.R.A.C.L.E. laboratory of Niccolò Cusano University has as common focus the analysis of learning processes through scientifically validated methodologies. In particular, as regards the educational reality, of great importance is the strand of studies related to Educational Data Mining, that deals with designing models and algorithms useful for the development of new educational strategies through the formulation of accurate predictions on the behavior and performance of students and teachers. Within the conceptual framework exposed, the study group coordinated by Prof. Luigi Piceci, and composed by Dott. Emanuele Marsico and by Dott. Umberto Barbieri deals with studying the applications of Machine Learning in the educational field, mainly analyzing the different variables that influence the learning processes at an intersubjective and environmental level. Specifically, this field of investigation aims to structure a new model of learning motivation that enhances the differential weight of a series of cognitive factors, affective, sociodemographic and intraindividual through the use of a machine learning algorithm. The data in question are obtained through the application of an experimental evaluation protocol consisting in the administration of a series of tests validated in digital format that investigate the various components of the motivational processes and determine their effective manifestation both on a conscious and unconscious level. In this sense, the algorithm used will allow the creation of a predictive model of learning motivation that, based on the data collected through the administration of the presented protocol, allows the identification of motivational profiles structured on the basis of a computational process of systematization of indicative values in reference clusters calibrated on subjective characteristics. This model will provide useful information to university teachers for the setting of personalized training courses to enhance individual motivational events.

4. CONCLUSIONS

Many examples have been treated on the benevolent use of digital, the road ahead is still long and uphill, but if you do not start from improving education and work by making digital a support and not an enemy, it cannot build a future that is adequate to the many problems that lie ahead, first and foremost climate change.

It will rediscover the privilege of giving ourselves, of giving our person not to obtain something in return that is useful pragmatically, but to nourish emotions and feelings that must be the engine of the world to create solidarity, cooperation and mental openness.

Since Copernicus the human being has discovered that he is no longer at the center of the world and every current signal I am continuing to tell him that he must reinvent himself, rediscover himself, measure himself against his limits and perhaps, what he must do, is simply to take a step back and return to being human, a human with the peculiarities that have distinguished him for millennia and that technology can not supplant.

Simplicity is the answer to complexity, banality is the answer to novelty, nature is the answer to technique. Let us go back to see with more disenchanted eyes a world that immerses, encompasses, sometimes almost suffocates, only in this way we can judge and change it more critically, more concretely.

The comparative analysis of all these results shows the innovation of these methodologies and clarifies the satisfaction of users who can take advantage of these new educational content, but above all of a method of teaching that makes it comes closer and closer to the needs but above all to the peculiarities of individual students, going to intercept them in the moments most suited to them.
It is the birth of a new era that brings into vogue the possibility of creating a smart, dynamic and innovative environment, leaving behind what slowed down schematic and repetitive learning to be more modular on the expectations and interests of learners.

The satisfaction of students, the effectiveness of the tools used that eliminate geographical and temporal barriers, the rapid connection and the intersection of various topics almost simultaneously, These are just some of the highlighted parameters that are among the positive aspects on which research still has to do a lot of work.

The digital revolution has started some years ago and the school must be one of the institutions capable of understanding and managing it in order to consolidate useful learning for students.
If you want to breathe in a sea of information you need to provide the right boats and the right equipment to conduct a safe and profitable trip.

REFERENCES

Aristotele (2017). *Etica Nicomache*a. Bompiani.
Vanni Codeluppi (2021). Vetrinizzazione. Individui e società in scena, Bollati Boringhieri.
Vanni Codeluppi. (2012) Ipermondo. Dieci chiavi per capire il presente, Laterza.
Vanni Codelupi.(2019) Il tramonto della realtà. Come i media stanno trasformando le nostre vite, Carocci.
Vanni Codeluppi (2003). *Il potere del consumo: viaggio nei processi di mercificazione della società*. Bollati Boringhieri.
Noam Chomsky. Dis-educazione. Perché la scuola ha bisogno del pensiero critico
Franco Ferrarotti, Il pensiero involontario nella società irretita
Franco Ferrarotti. Un popolo di frenetici informatissimi idioti
Franco Ferrarotti. L'empatia creatrice. Potere, autorità e formazione umana
Luciano Floridi (2022). *Etica dell'intelligenza artificiale. Sviluppi, opportunità, sfide*. Raffaello Cortina.
Luciano Floridi (2022). *In poche battute. Brevi riflessioni su cultura e digitale 2011-2021*.
https://ssrn.com/abstract=3998228
Luciano Floridi (2020). *Digital's Cleaving Power and Its Consequences*.
https://ssrn.com/abstract=3839296
Luciano Floridi (2020). *Il verde e il blu. Idee ingenue per migliorare la politica*. Raffaello Cortina.
Luciano Floridi (2020). *Pensare l'infosfera. La filosofia come design concettuale*. Raffaello Cortina.
Luciano Floridi (2017). *La quarta rivoluzione. Come l'infosfera sta trasformando il mondo*. Raffaello Cortina.
Milena Gabanelli (2022). *Smartphone e social ai figli. I capi del web li vietano. I motivi*. Dataroom, Corriere della Sera.
Umberto Galimberti (2021). *Il libro delle emozioni*. Feltrinelli.

Matthew Lipman. Educare al pensiero
James Lull (2000), Media, Communication and Culture: A Global approach, Polity Press.
Massimo Recalcati (2014). *L'ora di lezione. Per un'erotica dell'insegnamento*. Einaudi.

EUROPEAN HIGHER EDUCATION IN 2050: THE VISION, THE EVOLUTION

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ABSTRACT

The European Higher Education and Research Area is going through a transformation process that will push Europe to a leading position on the way to a green digitalization of societies. The environment of learning, including methods and spaces is expected to change drastically. With knowledge of today's technologies we can only imagine the future but the way forward is almost clear. In this paper we will attempt to describe the learning in the future in both school and higher education as their evolution needs to develop in parallel. The paper will utilize results from several EU funded projects, including, STEAME, STEAME-Hybrid, ONLIFE, STEAME-Students, BYOD, FACILIATET-AI, STEAME Teacher Facilitators Academy, and more.

1. THE VISION BASE

The project "STEAME: Guidelines for Developing and Implementing STEAME Schools" that endinged on 31 December 2021 provides the ground for building the learning of the future as a kick-off of a paradigm shift to Education 4.0. It provides what steps Education Systems all around the world could follow in order to escape from Education 2.0 and change to Education 3.0 and eventually to Education 4.0 with learning based on inquiry and project based learning. Literature and research has been showing for years now that this should be the way forward in order to help school students develop the needed competences and skills that appear to lack when they enter HE studies or enter the world of work. With today's development of digital learning most of the learning needed by school students can be easily accessible or retrieved at any time and place.

STEAME (Science - Technology – Engineering - Arts - Mathematics - Entrepreneurship) has been developed to support European teachers' knowledge and understanding of creating successful STEAME learning and creativity project activities. It offers approaches to teaching, teaching materials, entrepreneurship aspects, organizational suggestions for STEAME-oriented teaching, propositions and

analysis of STEAME-oriented curriculum. All the OERs of the project are available through the STEAME Observatory at www.steame.eu . As an observatory, it is designed to be adaptive and dynamic, able to support a dynamic and adaptive STEAME Curriculum in any school that needs to implement STEAME activities in the learning process.

The process of adding and updating the content is a continuous one, providing the opportunity to all teachers across the EU and beyond to be up to date and to share and publish their own work if they wish to.

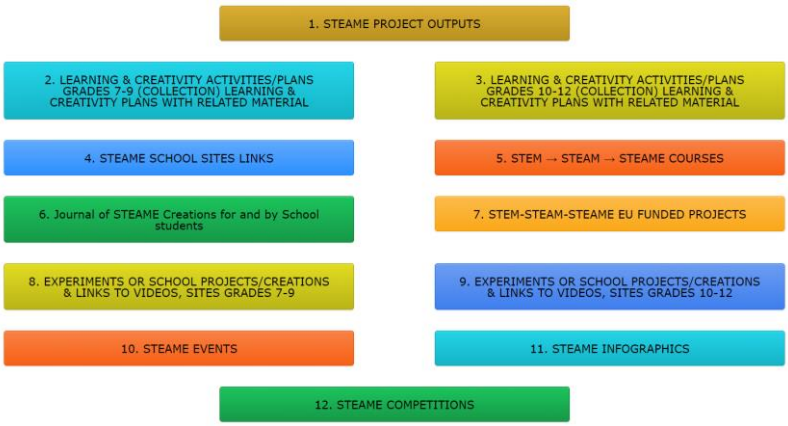

Fig 1: The structure of the STEAME Observatory

1.1 The STEAME Framework consists of the following elements:

1. Learning and Creative Methodologies (PBL-IBL-PSL)
2. Guide to Science Communication as a skill for students
3. Guide to Learning and Creative(L&C) Plan Development, including a a L&C Plan Template in different languages
4. Evaluation Rubric for implementing a project
5. Observatory (Guide to dynamic and adaptive STEAME material)

1.2 Methodologies adopted by the STEAME framework (PBL, IBL, PSL)

The following four methodologies are adopted by the STEAME framework:

A. Project-Based Learning Methodology (PBL)
B. Inquiry-Based Learning Methodology (IBL)
C. Problem Solving Learning Methodology (PSL)
D. A guided method to L&C Plans development with an 18 steps prototype procedure in supporting project based work of student groups, moderated and supported by at least two teachers of different disciplines.

The STEAME project, based on an International investigation, a European wide survey and based on focus groups with teachers and experts, associate partners and through its consortium creative work, has developed guidelines for STEAME school organization structures covering actions for existing schools and actions for future schools. Below we present indicative photos of the design of the STEAME School of the future. In the project website www.steame.eu , one can find a full detailed content and designs of the STEAME School of the future.

Fig. 2: A top view of the design of the school fully energy self-sustainable with photovoltaics

Fig. 3: A side view of the school one basement, ground floor, first floor and roof

The basement main content is a full set of STEAME Laboratories, VR rooms and entrances to the main amphitheatre and sports centre.

The ground floor contains mainly satellite laboratories, open work space, learning stations and base entries into the small amphitheatres, reception entrance and main dual reception of the sports centre, one entrance for the school students during the day and another entrance for the community during the night, the access to the internal yard and cafeteria and more.

The first floor contains open work space, learning stations, learning centres, learning rooms, a slow moving train with space for group student work, entry into amphitheatres and more.

The roof contains, photovoltaics providing green sustainable energy to the school, pool recreation area, circular sport field, sports courts, roof cafeteria and restaurant and more.

The school provides the option to change colours every day with an app so students decide what will be the colour of their school every day.

Fig. 4 The logo of the project STEAME

2. THE EVOLUTION

2.1 The evolution of Lesson Plans from what is happening today in most education systems located as EDUCATION 2.0 is evolving into Learning Plans and eventually into Learning & Creativity Plans. The STEAME project has adapted and developed the Learning & Creativity Plans as a new name of Lesson Plans.

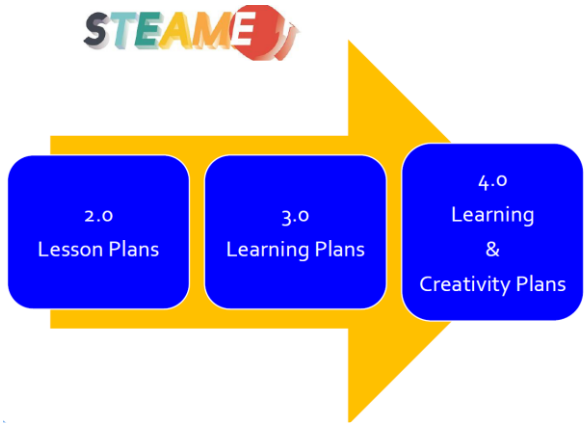

Fig. 5. The Evolution of Lesson Plans

2.2 The evolution of Pedagogy and Andragogy into Peeragogy & Heautagogy, the latter adapted by the STEAME projects.

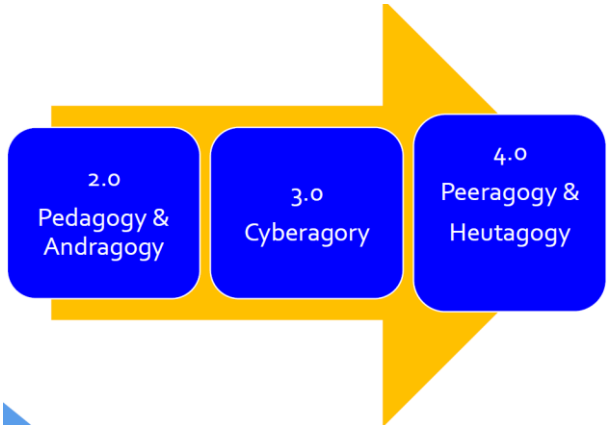

Fig. 6. The Evolution of Pedagogy and Andragogy

2.3 A second step development was the project STEAME-Goes-Hybrid where the PBL activity could be done remotely and online so students and teachers at distance (flip classroom or need due to lock-downs or need due to illness) can work on project work collaboratively and co-creatively. The platform access and guidelines of this solution can be found in www.steame-hybrid.eu

Fig. 7 The logo of the project STEAME-Goes-Hybrid

2.4 A third step development was the BYOD-Learning (www.BYOD-Learning.eu) where it is believed that all classroom learning can be transformed into video learning where each teacher can produce his/her teaching or facilitation of learning in to learning videos. These learning videos were originally planned to be of 45 min duration (usual classroom lesson duration) but also made available into more accelerated learning, that is 30 min and 15 min duration, supporting talented students in learning who could learn faster. Eventually and after reactions of students, the project adapted to the needs of students by supporting shorter videos, like 5 min each as smaller parts of a complete lesson plan duration. This will facilitate the learning at any place and anytime through an approach of Bring-Your-Own-Device (BYOD). The videos can also support the retrieving of knowledge and can save a lot of time from classroom learning so students can spend more time on applying knowledge through project work, thus developing competences and skills.

Fig. 8 The logo of the project BYOD_learning

2.5 The fourth step was to the need to support teachers in becoming adaptable to change and the project ONLIFE (https://onlife.up.krakow.pl/) has developed a special programme and module supporting teachers to develop competence in self-improvement and adapting to change without having to go through special trainings.

Fig. 9 The logo of the project ONLIFE

2.6 The fifth step was the need for teachers and students to understand the new tech environments governed by Artificial Intelligence (AI) . The project Facilitate-AI (www.facilitate-ai.eu) that started in February 2022 and will be completed in January 2023 aims to accomplish this in two main steps. In the first year the AI experts have trained teachers about AI and in the second year trained teachers are designing Learning & Creativity plans in support of facilitating the learning of AI by school students. During 2023 a training by teachers to teachers is planned for preparing teachers for a pilot learning activity.

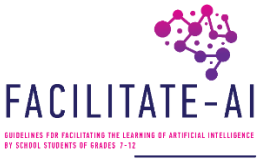

Fig 10. The logo of the project Facilitate-AI

3. THE STUDENTS

Following collaboration work with experts, teachers, academics and students, a critical need became evident to generate on one hand a bottom-up approach in bringing changes in Education Systems in the future as policy recommendations do not seem to generate movements for change and on the other hand to support the wider preparation of teachers for such a change.

Changing from traditional classroom learning into an open space PBL environment is not something that could happen from one day to another or even from one year to another. This change has high cost and requires big efforts by service teachers, by student teachers, by HE institutions and by authorities.

3.1 The sixth step came in to play with the need to organize the European School students and to give them a voice. By supporting school students to get a voice it is an opportunity to put force into change as nowadays young students adapt to technology changes and grow much differently than the way their parents and teachers grew. The project STEAME-Students developed a platform of communication for school students and supported the kick-off of the first European STEAME School Students Network, with acronym E3SN. The first committee developed its first working statute and a Manifesto , which was presented publically on 14 March 2023 in Krakow, Poland, during the EUROMATH & EUROSCIENCE conference for school students. The project ended on 31 May 2023 and the results can be found in https://thalescyprus.com/?page_id=3386 . A new project proposal named STEAME-Students 2.0 has been submitted in 2023 proposing the further and wider expansion of the E3SN with more student participation.

Fig. 11 The logo of the project STEAME-Students

3.2 The seventh step and may be the most important is the project STEAME Teacher Facilitators Academy, which started on 1st June 2023 , coordinated by the Pedagogical University of Krakow, Poland with 14 partners and 19 associate partners.

The main innovations to be delivered by this project are during 2023-2026 are:

1. STEAME Teacher Facilitators Competence Framework for student and serving teachers

2. STEAME Teacher Facilitators Learning Modules/Workshops

3. International Sharing Observatory for STEAME Learning Facilitators

4. Development of the STEAME Facilitators Community of Practice/Mentoring and Certification Programme

5. Policy Recommendations – European Federation of STEAME Teacher Facilitators Academies

The website of the project is already published at www.steame-academy.eu and has created its logo shown here

Fig. 12 The logo of the project STEAME Teacher Academy

Schools, Universities, Researchers can become associate partners through the website. In addition, regions in Europe and beyond may express interest in becoming regional STEAME-Teacher Academies supported by the special observatory to be created by this project.

Several parallel proposed projects building on the learning of the future are in the pipeline to complement the missing dynamic puzzle for the evolution of education that is expected to be created by Higher Education support through research and innovations. Some examples of these new proposals either running or submitted in 2023 include the REVEALING (VR Classrooms), STEAME-Hybrid Labs, STEAME-Parents and more.

All projects mentioned in this paper are co-funded by the European Union.

Fig. 13 The logo of the funding authority

USEFUL REFERENCES

Braund, M., & Reiss, M. (2006). Towards a More Authentic Science Curriculum: The Contribution of Out-of-School Learning. International Journal of Science Education European Union. (2014). Skills Panorama Glossary, Cedefop

Khine, Myint & Areepattamannil, Shaljan. (2019). STEAM education: Theory and practice. 10.1007/978-3-030-04003-1.

Koutsopoulos, K. (2019). STEM Revisited: A Paradigm Shift in Teaching and Learning the Science Related Disciplines. Journal of Education, Society and Behavioural Science 30(3): 1-10, 2019; Article no.JESBS.49101. Available: DOI: 10.9734/JESBS/2019/v30i330131

OECD. (2012). Education at a Glance 2012: Highlights, OECD Publishing. Rocard, Michel. (2007). The Rocard Report on Science Education.

STEAME L&C Plan. (2020). Customized e-Shop, STEAME Learning and Creative Plan, STEAME Project. Available: https://steame.eu/wp-content/uploads/2020/11/2.-STEAME_LC-Plan_e-Shop_EN-Grades-7-12.pdf

STEAME Guidelines. (2020). Guidelines for dynamic and adaptive STEAME curricula (IO1), STEAME Project. Available: https://steame.eu/wp-content/uploads/2020/10/steame-book-montage03.pdf

STEAME Outputs. (2021). STEAME Project Outputs. Available: https://steame.eu/1-observatory-outputs

Yakman, Georgette. (2008). STEAM Education: an overview of creating a model of integrative education.

Zervas, P., Alifragkis, C., and Sampson, D. G. (2014) "A quantitative analysis of learning object repositories as knowledge management systems," Knowledge Management & e-Learning Journal, vol. 6, no. 2, pp. 156–170, 2014. Available: https://www.kmel-journal.org/ojs/index.php/online-publication/article/view/240

*The Partners of all mentioned projects can be found in the corresponding websites of the projects as mentioned.

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DESI INDEX IN HIGHER EDUCATION. A SOCIOLOGICAL REFLECTION FOR DIGITAL MEDIA INCLUSION

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ABSTRACT

In recent years, the Italian public University has experienced an acceleration of the digitalization process, also thanks to its response to the health emergency generated by COVID Sars 19 in 2020. Specifically, in recent years it has invested above all in technological-infrastructural equipment in order to guarantee educational and administrative continuity at a distance. This has contributed to strengthening the connectivity of universities, which is one of the indicators underlying the European DESI INDEX.

The use of technological devices as educational and communicative mediators has inevitably led to a technical and technological literacy of the teaching and administrative staff, enabling an implementation of the human capital of the DESI INDEX itself, albeit from an experiential perspective. This digitalization process, however, has not always ensured a consequent process of didactic integration of technology, i.e. a process of normalization of the same that would induce an updating of teaching and knowledge transmission methodologies, helping to implement the soft digital skills of educators and students themselves. This gap has left open a challenge of reflection and research precisely on didactic design and experimentation through the use of technologies in the perspective of digital education, as well as on the critical and safety component underlying the sharing of data and online information.

The abstract intends to propose a reflection on the implications of the application of digital education in universities as an innovative didactic methodology for enhancing the soft skills of teachers and students in the perspective of onlife-education.

INTRODUCTION

The impact of digital in the university is a complex, interdisciplinary topic, still little explored and deepened from a political-governmental and scientific point of view, but gradually becoming of great academic and public interest in recent years, especially in the post-pandemic period. The lack of empirical research in this field, both of a national and international nature, does not make it possible to concretely reconstruct a clear picture of the process of dissemination and integration of digital capital in the daily practices of lecturers, students, administrative staff, and the perceptions of the actors within universities, leaving open an unexplored field of investigation rich in stimuli for scholars in the academy and beyond. By virtue of what has just been stated, the essay intends to promote a scientific reflection, exclusively theoretical, deepening the meaning of initiating a process of digital transformation in the academic world according to a sociological perspective, considering some international theoretical contributions that have offered in recent years interesting hints to build new keys to interpret the phenomenon investigated and to acquire greater awareness on the role of digital in the educational

system of the University. The absence of a theoretical framework shared at an international level and promoted by the European Commission on the subject, has not facilitated the task of reconstructing the significance related to the use of digital in the university system, for this reason, within this essay we have decided to use the DESI INDEX (Digital Economy and Society Index) of the European Commission, as the main guiding tool to critically reason about the impact of digital within the Universities, focusing on 4 main areas human capital, connectivity, the integration of digital into everyday practices within organizations and e-government. Starting from this first reading framework, we proceeded to read and semantically analyze about 40 international scientific articles related to the topic of digital transformation in universities, written in the sociological field in the post covid period (2021-2023), from which we extrapolated the main reflections that emerged in the literature on the digital topic, reorganized in 4 semantic categories: human capital, connectivity, integration of digital in learning/teaching practices, integration of digital in administrative practices. The essay therefore begins with an initial sociological reflection on what it means to speak of digital transformation in universities from a macro-social and micro-social perspective to focus, in a second moment, on the DESI INDEX as the key to interpreting and analyzing the impact of digital technology according to the four main areas of which it is composed (human capital, connectivity, integration of digital in practices and e-government). For each of these areas, some relevant theoretical conceptual definitions were subsequently reported and summarized from the analysis of the scientific literature produced in the post-Covid period on the subject.

1. THEORICAL BACKGROUND

According to Jakoet-Salie and Ramalobe (2023), Higher education digitalization is a transformative process (Seres et al., 2018) that has a significant impact on all the activities of higher education (Crittenden et al., 2019; Rampelt et al., 2018). It includes technological and organizational changes brought about primarily by the advancement of digital technologies (Menendez et al., 2016). The term “digital transformation (DT)” refers to the changes that digital technology causes or influences in all aspects of human life (Stolterman and Fors, 2004). It has implications for the Sustainable Development Goals set out in The United States 2030 Agenda: governments, institutions and organizations should commit with the goal of reducing the digital divide and improving social and cultural inclusion.

Digital transformation has often defined as a journey (TechCentral.ie, 2018), in which technologies will require a constant evolution of working approaches, systems and processes throughout the system, to add value to users (Higher Education Authority (HEA), 2019). Hence, digitalization pervades all processes, locations, formats and goals of higher education teaching, learning, researchs and work. Finally, Westerman et al. (2014) define the DT of an organization as the use of digital technologies to improve its performance and scope.

In the sociological perspective, the DT of HEIs could be considered as the process of technological, cultural and organizational change induced in these institutions by the development of digital technologies (Almaraz et al.,2017). It is not a matter of technology, but how people use technologies, how institutions intend to invest in technological progress to improve the management of different activities, how these technologies are integrated into practices by changing methodologies of use and the previous ideas and assumptions (Diaz-Garcia et alii, 2022).

The incorporation of the possibilities of ICTs in Higher Education (HEI) is leading to the development of new strategic options using policies and plans according also to the new demands of the labor market.

Hence, in the macro social perspective, digitization process in the HEs system must take into account, at least, the following aspects:

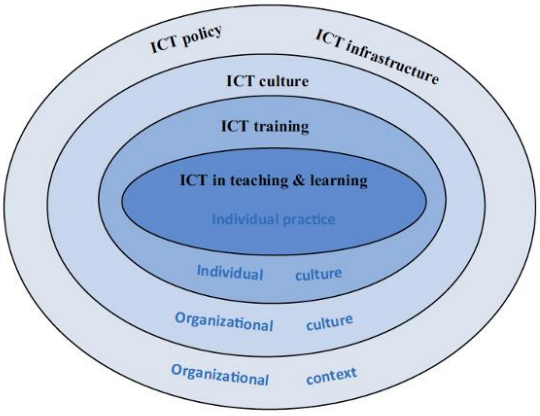
(a) strategically enabling DT development through an integrated and ecological perspective,

(b) moving away from basic forms of inquiry and incorporating multidisciplinary perspectives outside of educational sciences in order to advance theory and practice (Peters et alii, 2022).

In the first case (a), in Social Sciences the ecological approach assumes that technologies are not tools but environments within which relationships are built, interactions are established, symbols are shared and meanings are exchanged (Granata, 2015). According to this approach, digital media are part of wider relational systems, which are cultural, social, natural (De Biasi, 2007, p.13). Within such systems, the media take on roles and functions of support and management of educational, commercial, political, economic and cultural or entertainment activities. Media build relationships of mutual influence that contribute to the construction and sharing of symbols, perceptions of reality, ideologies, beliefs that modify people's way of thinking, acting and relating, as well as of constantly looking at and interpreting the surrounding reality. In order to summarise this ecological view of media, it is particularly effective to use the representation of this socio-cultural view of media proposed by some scholars, such as Tongeurs et al.(2008).

These scholars proposed a model of ICT integration in the form of concentric circles; it represents the complexity of the topic involving of integration of digital media in a sociocultural context, where it is possible to consider many characteristics that can influence the spread of digital technologies. Specifically, these scholars had to consider contextual features, cultural characteristics, teachers' structural characteristics, cultural characteristics, and ICT used in classrooms.

Fig.1 Conceptual model of ICT integration



Source: Yuting Zhang Donnie Adams, Kenny Cheah Soon Lee, 2022

In the figure 1, the ICT infrastructure dimension (Kundu et al., 2020; Mutisya, 2020) involves the construction of hardware, software, digital resources, and related services, as well as the arrangement of ICT funding within the institution by assessing physical, service and financial aspects. The technological investment is the basis for enabling access to digital equipment and resources and administrators play a critical role in providing guidance and services for ICT applications. Hence this dimension is connected to the ICT policy adopted in the higher education that may favor the investment in this field.

The institutional ICT culture is a critical component that predicts the level of ICT integration. It refers to values, knowledge, beliefs in digital culture that may orientate the digital perception of actors (researchers, professors, administrative staff and so on) and the socio-material relationships between institutional factors that dynamically interact with each other and that could be improved, fostered and changed during the process (Connell, 2019). They can influence the ICT integration in HE.The ICT

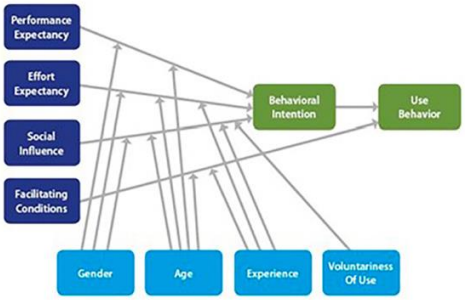
culture also influences the pedagogy and the digital course design, the idea of teaching and learning, the level of autonomy or innovation and collaboration principles at the basis of teaching, the teaching efficiency and the ICT-integrated curriculum (Blau & Shamir-Inbal, 2017).

ICT training is indispensable in ICT integration mentioned in the model (Tondeur et al., 2008) to improve technical digital skills and soft digital competences (Cortoni, Lo Presti, 2018) in the professional field. University teachers expected institution-based ICT training programs to facilitate the autonomy of teachers and their reflection on educational technology usage, to facilitate the implementation of technology in their educational activities. Finally, the ICT in the teaching dimension concerns the teaching practices of confidence, convenience, courses preparation and usage in curriculums, while ICT in the learning dimension refers to the learning practices of creation, exploration, communication and professional learning in the digital field.

In the second case (b), according to Kravchuk et alii (2022), the use of digital technologies in education is a complex system including interconnected structural-functional elements, namely: structure and subsystems, purpose, goals, challenges, principles, main tasks, functions, stakeholders (interest parties) or subjects, content and methods of educational activities, system dynamics, essence and features, factors and conditions, etc. For instance, technologies can optimize the organization of the educational process, speed up communication processes, increase the level of learning efficiency. They intervene to modify more aspects in the HE system, such as the streamlining of orientation, student and teacher recruitment, placement, tutoring, administrative support services from an e-government perspective. Finally, their practical use ensures the update of the competences of HEIs' participants: teachers, administrative staff and students. Hence, ICT integration in higher education must be explained by a framework to allow integration of individual and institutional characteristics from micro- to macro factors.

According to Esteve-Mon (2022), there are some models in the literature that connected to the responsibility for the success of technological implementations in HEIs. For example, UTAUT model is composed of four main constructs including: performance expectancy, effort expectancy, social influence and facilitating conditions. In this model, facilitation conditions refer to the facilitations provided by the institution for the faculty members to teach in online environment such as professional development and technical support etc. Also, effort expectancy refers to the expected efforts that faculty members need for using online teaching tools compared to the benefits received by that effort. Social influence is related to the peers or other faculty members' influence to use online teaching. Finally, performance expectancy refers to how using the new technology may enhance the performance of users (Aljanazrah A, Yerousis G, Hamed G and Khlaif ZN (2022). Some basic variables gender, experience, voluntary use, and age can influence ad orientate the functioning of the model.

Fig.2. Unified theory of acceptance and use of technology



Source: UTAUT; Venkatesh et al., 2003

2. DESI INDEX AND HES IN POST COVID PERIOD

The Digitization Index of Economy and Society (DESI INDEX) is the tool through which the European Commission since 2015 has started to monitor the digitization process of the 28 EU member states from 4 main areas: connectivity, human capital, the integration of digital technologies in the organizational context, the use of digital in public services (e-government).

Starting from this model, we use the same theorical structure to analyze the digitalization process in Higher Education. It is structured in four main dimensions:

1. **The investment in the technological infrastructure equipment** that is the basis to integrate the digital culture in the social context, such as the Higher Education (it could be connected whit connectivity area of DESI INDEX);
2. **The human capital** in higher education, that means the improvement of digital competences of teachers, students and administrative staff;
3. **The integration of digital tools in the daily activities** in these following fields: teaching and learning, research, support services, administration, and communication, as well as the need for students and faculty to acquire new (digital) skills for their future workplaces (Rampelt et al., 2018);
4. **Integration of technological means in the administrative procedures** to improve the quality of services in the higher education. The use of ICT is essential to many business processes of universities, including institutional communication, library management, HR management, teaching and student support, research and technology transfer support, project management and fundraising, financial support, IT support, legal support, logistics, strategic planning, and many others (Maltese, 2019).

In the following paragraphs we analyze each of these dimensions in HE, starting from studies and researches described into the recent scientific and intenrational literature in the post COVID period. These dimensions are at the basis of digital capital in the Higher Education (Ragnedda et al., 2018; Paino and Renzulli, 2012; Pitzalis, 2016; Cortoni, 2020). With this expression, we define the material and immaterial resources used in the specific social space, such as the HE system, to achieve specific educational goals. In the macro perspective, digital capital refers both to the endowment infrastructure and technology (DESI INDEX connectivity), as well as to the number of training and school digital experimentation, to implement the cultural capital of teachers and students on technology (digital literacy) and through technology (digital education). From a cultural point of view, the investment in projects of experimentation and training on digital literacy, or digital education, can contribute to increasing the digital skills of all school actors (teachers, researcher, students, staff and so on), hypothetically improve the efficient functioning of the school system, perceived externally as a factor of educational quality (DESI INDEX human capital). Still in the macro perspective, digital capital is doubly connected to financial capital, insofar as opportunities for economic investment, both institutional and public and private, can stimulate the purchase of technological equipment and educational experimentation.

Moving from a macro to a meso-social perspective, digital capital seems connected to the concept of educational innovation, from design to classroom experimentation to the teaching, learning and assessment of student learning, changing their relational dynamics (social capital) and cultural capital, as well as the sharing of digital skills in teaching activities, management and organizational activities (DESI INDEX Digital Technologies integration). Finally, from a micro-social point of view, digital capital is identified with a specific dimension of the cultural capital of each individual (digital competence), and with attitudes embedded in individual use (Ragnedda et al., 2018; Paino and Renzulli, 2012; Pitzalis, 2016; Magaudda in De Feo and Pitzalis, 2014).

2.1 TECHNOLOGICAL EQUIPMENT OF HES

Technologies are the initial and basic component of a first step, the “digitalization” of “HEIs,” when they tiptoe into the “digital economy” using “innovations” in the “management” of the “information” of the organization, which requires the acquisition of “digital competences” by their members (Díaz-García et alii, 2022).

The Digital Transformation of Education: Connecting Schools, Empowering Learners in 2020, the International Telecommunication Union (ITU), the United Nations Educational, Scientific and Cultural Organization (UNESCO), and the United Nations Children’s Fund (UNICEF) called for strengthening national infrastructure to ensure that Internet connectivity is more reliably and widely available (Unesco, 2022). In 2021, UNESCO published the Strategy on Technological Innovation in Education (2022–2025) to study emerging and future technological changes and their impacts on education and support member countries to develop remote learning platforms, learning tools, open educational resources, and effective learning methods, to enable equitable and inclusive quality education and promote lifelong learning opportunities for all.

According to the 2021 EDUCAUSE Horizon Report® | Teaching and Learning Edition, published by EDUCAUSE, the key technologies and practices that will have a significant impact on the future of teaching and learning in higher education are AI, Blended and Hybrid Course Models, Learning Analytics, Micro-credentialing, Open Educational Resources (OER), and Quality Online Learning.

The main digital resources and formats implemented in educational teaching in HE institutions during the COVID-19 pandemic have been LMS platforms of the institutions themselves: the videoconference—Zoom or Microsoft Teams; the creation and use of educational videos; the exchange of messages by the usual means (email) or through instant messaging applications—as WhatsApp Messenger—combined with the use of social networks, mainly used for communication or, alternatively, as an LMS platform (see fig.3).

In this sense, it can be noted that most of the applications or technological solutions used for the continuity of teaching are open educational resources (OER), that are available free of charge, or reusable educational resources (RER) that have been integrated into LMS platforms. (cfr. Rodríguez et alii, 2022).

Fig. 3 List of potential technologies implemented in HE during COVID period

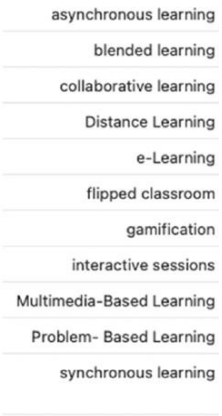
FORMAT	TYPE OF RESOURCES
SUPPORT	LMS Integration Content Lessons and courses Format/Language
TOOLS	Video conference Presentation Messenger service Response Storage Collaboration Support/Adaptation Social Networks
DIGITAL UNITS	Video Audio Text
SERVICES	Access to documents Identity Search Migration

Source: Rodríguez, M.L.; Pulido-Montes, C. 2022

According to Aljanazrah et alii (2022), online platforms such as learning destination sites (LDS) and learning management systems (LMS) are transforming learning experiences by allowing the learners to access and download courses, manage and track progress, take notes and actively participate in discussions with peers and co-learners (Bekova et al., 2021). Virtual communities of practice are empowering faculties to adapt to the evolving pedagogy and course work through resource sharing and curating engaging classroom experiences (Hodges et al., 2020). Digital curriculums are enabling curriculum-aligned, next-generation assessments that can provide automatic grading, support prompt feedback, track reasoning and understanding through strong analytics from different data sources (Ertmer, 1999).

The integration of these tools in education contribute to transform some didactic methodologies. The blended learning methodology involves the integration of resources within a methodological structure that is defined by educational moments marked by asynchrony and synchrony; such a methodology seeks to enhance performance, the integration of digital technologies and collaborative learning. This approach involves the application of a blended methodology, a process of developing pedagogical reflection, skills and resources (cfr.Rodríguez, et alii, 2022).

Fig. 4 List of methodologies developed during COVID period



Source: Rodríguez et alii, 2022

According to UNESCO (2022), after COVID period, HEIs need to transform their supportive services for the digital transformation of teaching and learning, following these main principles:

- **Change from single services to systematical services:** HEIs need to adopt the principle of systematization to provide well-connected and integrated supportive services by linking all elements of teaching support, strengthening the connectivity between all stakeholders and breaking the boundaries between scattered services, isolated links and separate departments.
- **Change from physical space to integrated space:** As teaching expands from traditional physical space to the integration of physical and digital spaces in the wake of the digital transformation, supportive services need to cater for teachers and students anytime and anywhere in the integrated teaching space.
- **Change from single-point services to whole-process services:** As digital teaching goes beyond traditional classrooms and breaks through the limitations of time, the teaching support team needs to provide whole-process services for activities before, during and after class.
- **Change from serving groups to serving individuals:** HEIs need to move away from traditional teaching services. Instead, they should provide supportive services that can meet the individual needs of teachers and students and develop personalized instructional design, curriculum management and learning evaluation by means of learning analytics and adaptive technologies.

Hence, HEIs need to build a technical environment that has to follow these indications:

- **Upgrade physical places of instruction in a digital way:** Physical places of instruction such as classrooms can respond interactively to various requirements of the digital teaching space once they are equipped with digital equipment to realize the data transfer between physical and digital space.
- **Build an internet-based teaching environment:** HEIs need to make an overall and coordinated plan to fill the gap between what the current campus network, digital facilities and equipment, learning management system software and digital teaching resources can offer and what teachers and students really need in the process of digital transformation.
- **Apply new-generation digital technologies:** new-generation digital technologies such as AI, learning analytics, IoT, social robots and blockchain will deeply integrate with higher education teaching.
- **Emphasize security and fairness:** The development of technology should be planned with ethics, fairness and justice as the core in advance instead of afterwards. To ensure data security and privacy protection, HEIs, teachers and students need to participate in the development process of technical systems, and actions should be taken to raise awareness, build institutional systems and enhance maintenance and management. Investment in network connection, digital equipment and organizational capacity of HEIs should ensure equal access to digital education for all learners.

2.2 HUMAN CAPITAL IN HES: DIGITAL LITERACY AND COMPETENCIES

The development of ICT skills has been identified as a critical element of students' future full and active civic participation (OECD, 2015). This expression refers to the knowledge, skills and confidence required to use available technology and devices to achieve objectives and results (PWC, 2018). Digital literacy entails the correct use of available data as well as the appropriate application of new technologies (Seiler and Fischer, 2021).

According to UNESCO (2022), Digital literacy is the ability to safely and appropriately acquire, manage, understand, integrate, communicate, evaluate and create information through digital technologies to promote employment, work and entrepreneurship, including the ability to apply digital technologies, information and data literacy, the ability to communicate and collaborate with digital technologies, the ability to create digital content, awareness of digital safety and digital ethics, continuous learning, problem solving, reflection and self-improvement through digital technologies, and digital expertise and competence. Among them, digital technology application ability, information and data literacy, digital expertise and competence are the essential components of digital literacy, serving (Law et alii, 2022) teachers act as technology facilitators for a shared ICT vision (Blau & Shamir-Inbal, 2017; Hero, 2020).

Morgan et alii (2022) introduce a framework of digital literacy that is structured in three main areas:

1. technical (operational literacy);
2. cognitive (Information literacy);
3. etiquette (legal, ethical and social literacy).

The technical skills refer to the operational literacy of individuals that are at the basis of access digital competencies. Second, are the cognitive abilities of searching, assessing, analyzing, evaluating, synthesizing and communicating digital information. This cognitive dimension focuses on the use of existing information and the creation and sharing of new information (critical digital competencies). Third, is etiquette which allows for appropriate and contextual online interaction and behavior. This involves ethical and legal literacy, as well as social aspects of communicating in personal and professional digital environments (awareness digital competencies).

Based on this framework, digital literacy can be described as the ability to access, analyze, evaluate and communicate digital information, using relevant digital tools in a manner which is legally, ethically and socially aware. 'Access' refers to not only having technical, but also beholding the operational understanding, knowledge and essential skills required to use it. 'Analyze' refers to one being able to navigate, determine bias and quality, summarize and assess information or data for interpretation and processing. 'Evaluate' refers to critically reviewing and determining significance, legitimacy and authenticity when encountering an infinite supply of online information. 'Communicate' refers to producing and sharing insights and formulating messages that fit the required medium. This includes operating and communicating in a safe, legally and ethically appropriate manner.

Conceptualizations of digital literacy have also emphasized the importance of social context, such as privacy and appropriate use of language (e.g., Ng, 2012a). Therefore, digital literacy is critical for higher education graduates' employability and citizenship. Graduates face various challenges associated with technological and digital change, such as: handling big data, cyber security and the proliferation of 'fake news'(Oliver & Jorre de St Jorre, 2018). These are digital soft skills (Cortoni, Lo Presti, 2018), connected to the awareness and critical thinking competences focus on commodification, datafication and personalization processes of platform society (van Dijck at alii, 2019).

The implementation of teachers' digital competences responds to the need to prepare students for a strongly digitized socio-cultural context and represents one aspect to be included in the educational mission of universities themselves, in order to prepare 'e-leaders' in different professional fields.

The Definition and Selection of Competencies Project - DeSeCo (OECD, 2005; Salganik et al., 1999) pointed out that competences are more than just knowledge and skills, as they include the ability to cope with complex demands by putting those skills into action in specific situations (the main areas of the project are three: 1. interactive usage of media tools, 2. working with others and working in society, 3. the use of psychological resources, abilities, and attitudes. In this context, digital competence is considered one of the key skills for accessing lifelong learning (Europea Union, 2006; Morselli, 2019). The changes resulting from the introduction at the beginning of the 21st century of the concept of competences as an educational goal (Rychen & Salganik, 2003) have led the university to assume pedagogical criteria of student-centered learning (Perez Rivero, 2022).

According to Peters et alii (2022), the digital competence of teachers (TDC) has defined as the set of skills, attitudes and knowledge required by educators to function productively, safely and ethically in diverse and digitally mediated environments (Esteve-Mon et al., 2020; Falloon, 2020). The definition of Digital Literacy is connected with the definition of Digital Competences.

Finally, according to the General Secretariat of the Council of the European Union, digital competence involves the confident, critical and responsible use of, and engagement with digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, media literacy, digital content creation (including programming), safety (including digital well-being and competences related to cybersecurity), intellectual property related questions, problem solving and critical thinking (European Union, 2018). In this definition all areas of the European Digital Competences for citizens (DIGCOMP 2013 and the followed upgrades) are mentioned.

Starting from the international literature in this field, in the last years, many theorical frameworks on digital competences are defined. In Europe, since 2013 the framework on digital competences for educatorsm the European framework for the DC of educators (DigCompEdu), is implementing, it aimed at guiding policy and implementing regional and national training programs (Redecker & Punie, 2017). This framework analyses and validates the digital competences included in 6 areas of professional life of educators: 1. Improving Professional engagement, 2. developing educational resources, 3. designing

and enacting teaching and learning activities, 4. assessment practices; 5 enhancing the soft skills, 6. digital skills of students (Esteve-Mon et al., 2020).

In the international literature, many other International frameworks of digital competences has been analized such as:

- *Technology, pedagogy, and content knowledge model* (TPACK), where content knowledge has to be combined with methodological knowledge of pedagogy and technological knowledge. In this sense, teacher competences in the HE have to be soft skill.
- *International Society for Technology in Education* (ISTE) Standards for Educators, that provides competencies for learning, teaching and leading in the digital age, giving a comprehensive roadmap for the effective use of technology in educational contexts such as the HEs.
- *The ICT Competency Framework for Teachers* (ICT-CFT) (UNESCO, 2018) that is a global standard to evaluate teachers' ICT competency and it is structured in six dimensions: (i) Understanding ICT in education policy; (ii) Curriculum and assessment; (iii) Pedagogy; (iv) Application of digital skills; (v) Organization and administration and (vi) Professional learning.
- *Spanish Common Framework of Digital Teacher Competence,* developed by the National Institute of Educational Technology and Teacher Training (INTEF, 2017), which is based on the digital competence model DigCompEdu developed by the EU.
- *The European e-Competence Framework for ICT Professionals* (e-CF ICT),
- *The Global Media and Information Literacy Assessment Framework* by UNESCO 2013 (Kuzminska et al., 2018).
- *The JISC Digital Capability Framework*, that is focused on four key areas and an overarching competency enveloping ICT proficiency for digital identity and wellbeing, as the core of digital literacy – 1. Information, data and media literacies, 2. Digital creation, problem solving and innovation; 3. Digital communication, collaboration and participation; 4. Digital learning and development (JISC, 2019).
- *Digital Teaching Professional Framework* (Education & Training Foundation, 2019),
- ISTE Standards for educators (ISTE, 2018), is a widely used standard worldwide to evaluate technology leadership, or function as guidance for related training, which explains the main necessary features of technology leaders in detail. It consists of five leading practices: (i) Equity and citizenship advocate; (ii) Visionary planner; (iii) Empowering leader; (iv) Systems designer; and (v) Connected learner.
- *Competence framework for Teaching and Learning with ICT* (van Loon et al., 2018).

2.2.1 THE FRAMEWORK OF DIGITAL COMPETENCES IN HES

The main and sub-dimensions of the frameworks were identified, existing similarities were merged where necessary, and the remaining digital competencies were mapped. The result was an overview of identified dimensions. This resulted in an initial draft of the HeDiCom framework, which included four main themes: Teachers' digital literacy, Teachers' Professional Identity; Teaching and Learning with Technology; Empowering students (Tondeur et alii, 2023).

This framework is structures in three areas: professional learning that includes all competences at the basis of the development of the educator profile. This area includes social competences (communication and collaboration), methodological competences (innovation in digital practices) and teacher's professional learning (key competences of teaching professionality). In the second dimension Digital literacy the author describes three main categories of digital competences of educators:

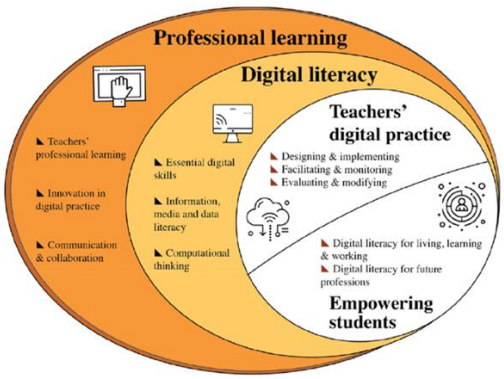
- *Essential digital skills* based on the improvement of technical and operational skills to use digital media;
- *Information, media and data literacy* that summarize different capabilities such as: searching for information, the organization of information, and the assessment of information (Almerich

et al., 2016). Carretero et al. (2017) for instance indicate that teachers must be able to analyze and compare both the information and the sources of digital content for reliability and credibility. They therefore need the necessary competencies to actively, creatively and critically use and understand data (López-Belmonte et al., 2019). They should be able to manage Big Data. This requires certain competencies in analytical treatment based on data mining, for the extraction of useful, valuable and meaningful information from large volumes of data (Huda et al., 2017).

- *Computational thinking* is only recently described as a relevant competence in Higher Education. It refers to break down a complex problem into steps and processes that can be solved using digital technologies and apply these solutions in their educational practice (Barendsen & Bruggink, 2019; Lyon &Magana, 2020; Wing, 2006).

The digital literacy competences are central for T*eachers' digital practice dimension, that includes designing, implementing didactic activities, facilitating the relationships in classroom* with students and with colleagues, monitoring, evaluating the effectiveness of the work and modifying it for future proposal. The digital literacy competences are also at the basis to implement digital competences of students for future professions and for living, learning and working (see figure 5).

Fig. 5 The HeDiCom framework



An other international framework of digital competences in HE is proposed by UNESCO in 2022. It is called Framework of teachers' digital competencies in Higher Education (UNESCO, 2022). It is structured in four main areas:

1. Digital awareness;
2. Digital literacy;
3. Digital capacity;
4. Digital research.

Each area is structured in three stages: acquisition that is the basic access stage, deepening that means intermedium stage and creation as the innovation stage (see figure 6).

In the first area, *Digital awareness*, teachers become aware of the importance of digital technology in teaching (acquisition stage); in the deepening stage, teachers acquire relevant knowledge and methods of ICT-based teaching, and start to practice innovative teaching. In the innovation stage, teachers develop ideas and methods to innovate and update teaching models.

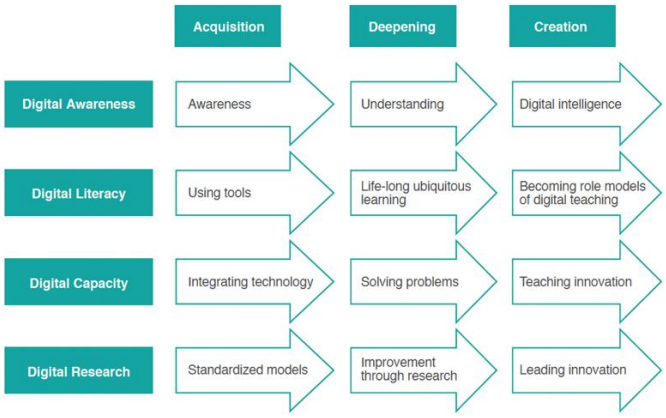
Digital literacy area is a prerequisite for helping learners to develop core competencies of the 21st century. In addition, teachers also need to have professional literacy to integrate digital technology into teaching activities. In the acquisition stage, teachers obtain a preliminary understanding of common digital technology tools for their work (such as office software, online teaching platforms, visualization

tools, popular social media apps, etc.). In the deepening stage, teachers use various open online courses, user-generated content from social media, etc. to carry out professional learning on smart devices and develop the habit of lifelong learning. In the innovation stage, teachers develop the ability to flexibly apply models of digital teaching.

Digital capacity area refers the ability to apply knowledge and skills in practical professional activities. In the acquisition stage, teachers could master one way of integrating technology into curriculum as part of the digital teaching. In the deepening stage, teachers diagnose problems in teaching, solve problems with the help of digital technology, to improve teaching continuously. In the innovation stage, teachers flexibly apply digital technology to innovate teaching models and help students to cultivate higher-order thinking skills, as well as the ability to explore, cooperate and autonomously construct their knowledge base.

Digital Research refers to use digital competences to improve the research processes. In the acquisition stage, teachers learn to conduct research based on standardized models, to diagnose problems in teaching and improve accordingly. In the deepening stage, teachers design teaching methods based on characteristics of courses and instructional conditions, in order to continuously improve teaching models and methodologies. In the innovation stage, teachers explore teaching patterns through research, deeply reflect on teaching, innovate teaching models and encourage other teachers to develop together through sharing and communication.

Figure 6. Framework of teachers' digital competencies in Higher Education



Source: UNESCO, 2022

In the HE context, teachers are leaders, they must take new responsibilities, prepare to accept, use and integrate technology in the university, and equip themselves with the newest technological knowledge and skills, as adapting to technology developments is indispensable for modern educators. Technology leadership refers to the combination of technological literacy, academic ability and management competencies to select, exercise and guide technology usage, which supports all education stakeholders to effectively deal with the exploration of technology-related tasks. Technology leaders are individuals who can empower followers to understand, select, assess, utilize and manage technology and innovation effectively (Daugherty et al., 2013). Previous studies have explored theories, conception and evaluation standards of educational technology leadership from various perspectives. Appropriate frameworks are needed to guide leaders to meet the demands of practice effective technology leadership (Zhang et alii, 2022).

Rogers [2000] argues about a paradigm in the integration of technology into higher education, due to the new requirements for the set of technological competences of teachers. According to the author, the key areas of technology integration are:

1. learning/teaching, (Planning and implementation of digital devices and other resources in the educational process in order to increase the efficiency of educational technologies. Proper management and streamlining of digital learning strategies.);
2. leadership (The application of digital technologies and services in order to enhance interaction with students, within and outside the learning process. The use of digital technologies for timely and focused leadership and assistance. Experimenting and developing new forms and formats of leadership and providing support.);
3. self-regulation of learning (The application of digital technology to support self-regulated learning, that is, to teach students to plan, monitor and reflect on their own learning, provide evidence of progress, share opinions and generate creative solutions);
4. coeducation and collaboration (Promoting and improving collaboration, cooperation and knowledge creation);
5. assessment and analysis of outcomes, formation of current and final assessment (Improving the diversity and suitability of assessment formats and approaches. Selection, critical analysis and interpretation of digital indicators of performance, efficiency and progress);
6. feedback and planning (The use of digital technology for targeted and timely feedback from students. Adapting learning strategy and providing targeted support based on indicators obtained by digital technologies. Enabling students and parents to understand digital technologies and use them to make decisions).
7. differentiation and personalization of learning (Meeting a variety of learning requirements, allowing different levels and speeds, and adhere to distinct learning paths and objectives);
8. accessibility and inclusion, (Ensuring the availability of educational resources and activities for all students, including those with special needs. Reflection on students' expectations, skills, uses and misconceptions, as well as contextual, physical or cognitive limitations on the use of digital technologies);
9. active engagement (The use of digital technologies to promote active and creative participation in the study of subjects. The use of digital technologies in pedagogical strategies promoting students' diverse skills, deep thinking and creative self-expression).

Starting from these features of teacher competencies in HE, the scolar describes a general list of specific teacher competences such as:

1. Knowledge and understanding of the subject area, professional activity.
2. Possession of critical thinking skills.
3. Possession of communication skills, ability to show empathy.
4. The ability to use information and communication technologies.
5. The ability of searching, processing and analyzing information from various sources.
6. The ability of personal and professional development.
7. The ability to generate new ideas, creativity.
8. The ability to apply best practices in professional activities.
9. The ability to motivate people and move towards a common goal.
10. The ability to act based on ethical considerations, motives.
11. The ability to show tolerance and respect towards cultural diversity.
12. The ability to conduct socially responsible and conscious actions (Kravchuk et alii), 2022.

This list of competence is comparable with the European framework of digital Competence of citizen (DigComp and following upgrades) that considers 5 main areas of digital competences: 1.Information and data literacy (connected with the Possession of critical thinking skills and The ability of searching, processing and analysing information from various sources); 2. Communication and cooperation (connect with the Possession of communication skills, ability to show empathy and The ability to use information and communication technologies); 3. The content creation (connected to The ability to generate new ideas, creativity; 4. Safety (connected with The ability to act on the basis of ethical considerations, motives; The ability to conduct socially responsible and conscious actions); 5. Problem solving (Knowledge and understanding of the subject area, professional activity; The ability to apply

best practices in professional activities; The ability to motivate people and move towards a common goal; The ability to show tolerance and respect towards cultural diversity.

2.3 INTEGRATION DIGITAL TECHNOGIES IN HE

According to Kravchuk and other scholars (2022), HEIs combine different approaches depending on the field of application of digital technologies in Higher Education. The Constructivism is the basic principle for the integration of technology in the context of the dynamism of scientific and technological progress, requiring teachers, administrators and students to constantly update their knowledge in the process of practice.

The components of constructivism are as follows: 1) the concept of lifelong learning, in order to update digital skills; 2) competence-based approach, involving the education of basic and special competences of teachers and students; 3) centralized approach to technical support of academic staff and students by creating standards, rules of procedures for the use of technologies; 4) systemic and structural-functional approaches for the integrated use of technology in various fields of higher education; 5) theory of student-centered learning based on the principle of student-centrism as the basis for the implementation of technologies, for instance, in the quality assurance system of HEIs for assessment of students' learning outcomes. (Englund at alii, 2017).

Within the framework of the constructivism concept, new approaches to teaching using technologies at HEIs are emerging. For example, **the Technological, Pedagogical, and Content Knowledge (TPACK)** framework is distinguished among approaches to the application of technologies by teachers in accordance with the strategies of teaching and the content of higher education (Dysart et alii, 2015). The gamified approach is also the innovative one, increasing students' motivation, productivity and performance through new principles, the possibility of adapting courses to students' interests [Kopcha et alli, 2016; Subhash et alii, 2018].

The digital transformation of higher education teaching and learning is not the application of digital technologies to education, but the integration of digital technologies and education, and that the aim is to improve the operations, strategic directions and values of HEIs and develop new education systems adaptive to the digital age. The digital transformation of higher education involves changes in institution's space, operations, strategic directions and values, as the digital age takes on different characteristics.

UNESCO (2022) defines four stages in applying digital technologies to education:

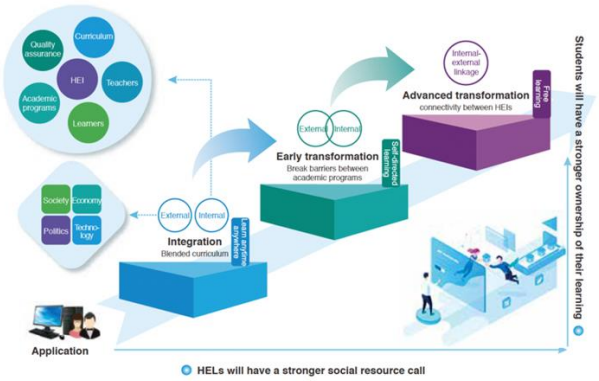
1. *building readiness stage*, focused on building infrastructure and developing teachers' digital competencies;
2. *applying stage*, focused on applying digital competences and tools in the daily activity to develop high-quality digital education resources and to improve learning management systems;
3. *infusing stage on innovative methods of teaching* based on the digital environment;
4. *transforming stage* focused on integrating emerging technologies to reshape education ecosystems.

It proposes a framework for the digital transformation of Higher education teaching and learning in three steps:

1. **integration**, where the curriculum development and delivery will not be limited by time or space. The core elements such as teaching objectives, contents, activities, assessments, and environment will be reshaped and reorganized by the integration of physical and virtual spaces. At this stage, students will enjoy more flexible learning by blending online and offline methods and HEIs will expand internet-based teaching.

2. **early transformation**, HEIs will gain access to external resources for curriculum development, such as those from other HEIs, relevant enterprises and social organizations. At this stage, HEIs will develop individualized curriculum designs with a flexible combination of course modules from different schools and academic programs to meet the diverse needs of students.
3. **advanced transformation**, digital technologies will completely break boundaries between HEIs, enabling connectivity between HEIs, between HEIs and society, and between HEIs and other stakeholders. By that time, sharing academic programs, curriculum, teachers, facilities, and services will become possible, and social resources will be fully utilized. As learners will have ownership over digital spaces, they can choose online courses and digital resources of other HEIs to meet their individualized needs.

Fig.7: Framework for the digital transformation of higher education teaching and learning

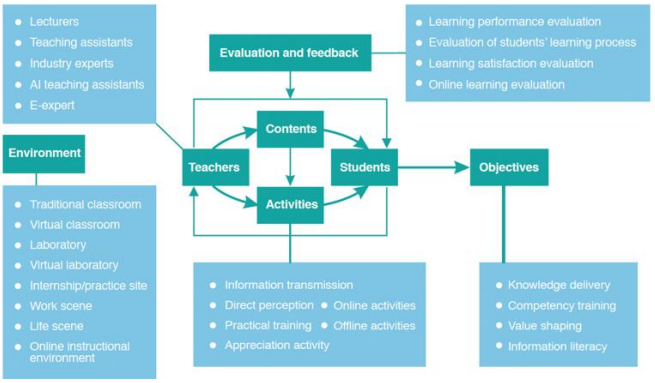


Source: UNESCO, 2022

In order to realize joint development and sharing of digital teaching resources across HEIs and academic programs, it is necessary to develop unified standards for developing shared resources to facilitate resource access and use; following the conditions of the Creative Commons (CC) licenses to protect the copyright of resource developers.

Second, establish a sound system for the management of shared resources. it means to develop relevant assessment and evaluation mechanisms to evaluate the quality of resource development and results of resource sharing and introducing a number of policy incentives based to encourage greater initiative, deliver higher-quality digital teaching resources, extend the life cycle of the sharing process, and promote the sustainable sharing of digital teaching resources. Third, adopt “customized” digital teaching resource sharing. Relying on digital teaching resource sharing platforms, students can have access to “personalized and customized” resources to meet their different needs (see figure 8).

Fig. 8: Key dimensions and their relationship in the digital transformation of teaching and learning



In this scheme, curriculum objectives refer to equipping students with the skills and abilities needed in the digital age and preparing them for the 21st century.

Curriculum contents is changing from fixed and structured knowledge to dynamic, open, unstructured and diverse contents. As big data, internet and other technologies advance, knowledge has been increasing and updating more quickly. Curriculum contents become more closely linked with social life and production, especially with the development of the latest science and technology and they are delivered by means of multimedia. Systematic, high-quality and dynamic digital open instruction resources have become an important source of curriculum contents.

Teaching activities are changing from face-to-face instruction limited to specific physical space to diversified instruction combining both the digital and physical spaces. Diversified electronic devices and technical systems such as smart phones, tablet, e-schoolbags, online instruction platforms and video conference systems provide strong support for carrying out various teaching activities.

Learning assessment and feedback change from static and summative assessment to dynamic, diverse, formative and big data-supported assessment and feedback. As new technologies such as mobile internet, cloud computing, big data, data mining, learning analytics and AI emerge, new methods for learning assessment keep springing up, making it possible to use big data generated in the teaching process to carry out multi-dimensional analysis, process evaluation and dynamic feedback.

Teachers will change from the role of one-way imparting knowledge to supporting students' autonomous, cooperative, and inquiry-based learning with technology. Students will change from passive receivers to autonomous learners supported by digital technology. Teaching environment: Changing from closed physical space in school to borderless and multi-channel connected physical and virtual spaces.

In this new hypothetical context new didactical methodologies have to be designed and experimented. Generally, this approach involves the application of a blended learning methodology. It is a process where all technological resources and others are integrated within a methodological structure that is defined by educational moments marked by asynchrony and synchrony.

After the COVID period, the new educational system, known as the hybrid model, has been defined by UNESCO as a 'learning approach that combines both remote and in-person learning in order to enhance the learner experience and ensure continuity' (UNESCO, 2020, p. 6). This model comprises different formats: flipped classrooms, live synchronous teaching through video conferencing, asynchronous activities to be carried out autonomously by students, and other remote features through technology platforms that professors use to provide instruction and feedback.

In this mixed format, educational institutions must make substantial technology investments in the classroom; in addition to the investment in technological resources, all universities have had to provide professors with training to cope with this new model by scheduling courses related to virtual teaching, content generation and new educational applications (De Obesso & Nu~nez-Canal, 2021).

According to Perez, Rivero et alii (2022), active methodologies such as flipped classrooms or the learning by doing approach have changed the role of educators. Instead of reinforcing the cognitive function, the educator becomes a facilitator and an active part of the teaching and learning process (Ladeveze & N!u~nez-Canal, 2018). Technology has contributed to this change in perspective and the new professors' role (Marcelo & Yot- Dominguez, 2019).

Some examples of international didactical methodologies already considered in HE, are described below:

- According to Arsenijević, J. et al. (2022), *The Community of inquiry model in online teaching* (Col) developed by Garrison, Anderson and Archer (1999), is based on three types of presence: social, teaching and cognitive presence. The teaching presence includes roles, activities, pedagogical forms and interventions of the teacher in order to establish interaction with students in the online learning process. According to this, Swan (2003) identified six best practices for teaching presence: establishing clear learning aims and instructions for students; using a wide range of presentations of course content; developing learning methods or exercises that enable students to be active and to be involved; providing students with feedback; being fexible in ways of achieving learning outcomes and providing students support and mentoring as much as possible. The second element of the Col model is Social Presence, which represents the extent to which students feel socially and emotionally connected to others and to the online environment in which they learn. The third element is Cognitive Presence, that includes the following phases: developing students' interest in the subject through the setting of a learning problem, researching and reflecting on problems and finding possible solutions, problem solving and its application (Garrison and Archer, 2003). These phases are organized by the teacher, but they can be also the result of the social interaction among students, because it is feasible in an atmosphere of proactivity, dialogue and reflection (Garrison, Anderson and Archer, 2001).
- According to Jakoet-Salie and Ramalobe (2023), *the Online Collaborative Learning* (OCL model), proposed by Linda Harasim (2017), is a well-known teaching approach in online education. It entails people cooperating, exchanging ideas and perspectives, establishing a shared understanding of specific themes and creating collaborative products (Magen- Nagar and Shonfeld, 2017). This theory emphasizes the Internet as a source of learning through encouraging cooperation and knowledge creation (Demuyakor, 2020). The OCL model is thought to aid in three stages of knowledge acquisition and building:
    1. Idea generating: This is a phase in which brainstorming will happen. Divergent concepts are brought together during this period.
    2. Idea organising: in this phase students compare, analyze and categorize the many concepts that have been created earlier, once again via debate and argument.
    3. Intellectual convergence: Intellectual synthesis and consensus occur during this stage. Assignments are written in the form of essays and collaborative pieces of work and students are encouraged to agree to disagree (Harasim, 2012).

CONCLUSION

Reflection and research on the impact of digital technology on the university is still an open and unexplored field of investigation that would require systematic government policy intervention at a European level, capable of providing guidelines for research and design of training interventions on and through digital technology in various spheres: from teaching to research, up to the third mission.

In this regard, an initial international mapping of what has been analyzed, studied and written by specialists in the field can certainly help to identify one or more theoretical frameworks on the subject, which can be adequately defined through reference dimensions, indicators and descriptors. Starting from such descriptors, it would be possible to circumscribe in a more conscious and targeted way the scholars' study and research interest on the different areas underlying the digitization process, such as the diffusion of digital skills in teachers and students, the degree of technological infrastructural endowment of universities, the type and level of integration of the same in daily professional practices, and the use of digital for the management of administrative practices.

After identifying the theoretical framework best suited to the characteristics of the educational context of the university system, shared at the European level, the second step that could be taken to work on the impact of digital technology at the university would concern the establishment of a research observatory capable of monitoring geographically and over time the digitization process in the various universities, enabling a longitudinal data comparison, but also on a geographical, national or international basis.

The third step, finally, could concern raising the awareness of political institutions on the issue of digital in universities, with a view to a governmental economic investment, on a European and national basis, able to work systematically on the implementation of digital and its culture in universities in terms of training of teaching and administrative staff on digital literacy, design and testing of management systems for teaching and administrative practice in universities, continuous technological updating and assistance, and on innovative teaching methodologies to be applied to universities in the perspective of the implementation of digital education within teaching and learning practices.

To achieve this goal, there is still a long way to go although there are local best practices on the use of digital in specific contexts and for equally specific objectives. Within this framework, the essay takes the form of a further small contribution of critical reflection on the issue of digital at universities, certainly not exhaustive in terms of theoretical reflection on the subject, which may however stimulate one to think about the complexity of the path to be taken in an interdisciplinary key and not to overlook the inevitable involvement of various stakeholders, directly or indirectly involved and interested in the implementation of digital policies and practices for the university.

REFERENCES

Aljanazrah, A., Yerousis, G., Hamed, G. and Khlaif, ZN. (2022). Digital transformation in times of crisis: Challenges, attitudes, opportunities and lessons learned from students' and faculty members' perspectives. Front. Educ. 7:1047035. doi: 10.3389/feduc.2022.1047035

Almerich, G., Orellana, N., Suárez-Rodríguez, J., & Díaz-García, I. (2016). Teachers' information and communication technology competences: A structural approach. Computers & Education, 100, 110–125.

https:// doi. org/ 10. 1016/j. compe du. 2016. 05. 002

Al-Samarraie, H., Teng, B. K., Alzahrani, A. I., & Alalwan, N. (2018). E-learning continuance satisfaction in higher education: A unified perspective from instructors and students. Studies in Higher Education, 43(11), 2003–2019. https://doi.org/10.1080/03075079.2017.1298088

Arsenijević, J. et al. (2022). The quality of online higher education teaching during the Covid-19 pandemic. International Journal of Cognitive Research in Science, Engineering and Education (IJCRSEE), 10(1), 47-55.

Barendsen, E., & Bruggink, M. (2019). Het volle potentieel van de computer leren benutten: Over informatica en computational thinking. https:// repos itory. ubn. ru. nl/ bitst ream/ handle/ 2066/ 213908/ 213908. pdf

Blau, I., & Shamir-Inbal, T. (2017). Digital competences and long-term ICT integration in school

culture: The perspective of elementary school leaders. Education and Information Technologies, 22(3), 769–787. https:// doi. org/ 10. 1007/ s10639- 015- 9456-7

Cabero-Almenara, J., Guillén-Gámez, F. D., Ruiz-Palmero, J., & Palacios-Rodríguez, A. (2021). Digital competence of higher education professor according to DigCompEdu. Statistical research methods with ANOVA between fields of knowledge in different age ranges. Education and Information Technologies, 26, 4691–4708. https://doi.org/10.1007/s10639-021-10476-5

Cabero-Almenara, J., Guti.rrez-Castillo, J.-J., Palacios-Rodr.guez, A., & Barroso-Osuna, J. (2020). Development of the teacher digital competence validation of DigCompEdu check-in questionnaire in the university context of Andalusia (Spain). Sustainability, 12(15), 6094. https:// doi. org/ 10. 3390/ su121 56094

Carretero, S., Vuorikari, R., & Punie, Y. (2017). DigComp 2.1: The Digital Competence Framework for Citizens with eight proficiency levels and examples of use. Publications Office of the European Union.https:// doi. org/ 10. 2760/ 38842

Cortoni i., (2020). Le competenze digitali nella scuola. Un'indagine dell'Osservatorio Mediamonitor Minori della Sapienza di Roma, Carocci, Roma

Cortoni I., Lo Presti V., (2018). Digital Literacy e capitale sociale, FrancoAngeli, Milano

Crittenden, WF., Biel, IK. and Lovely, WA.(2019). Embracing digitalization: student learning and new technologies., Journal of Marketing Education 41(1), 5–14.

Daugherty, J.L., Mentzer, N. J., Lybrook, D.O. & Little-Wiles, J., (2013). Philosophical perspectives on technology leadership. In Technology integration and foundations for effective leadership (pp. 42–56). Hershey, PA: Information Science Reference. dot:10.4018/978-1-4666-2656-0.ch003.

Davis, F. (1989) Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. MIS Quarterly, 13, 319-340.

De Biasi, R., (2007). Gregory Bateson. Antropologia, comunicazione, ecologia. Raffaello Cortina Editore, Milano

De Feo A., Pitzalis M. (a cura di) (2014). Produzione, riproduzione e distinzione. Studiare il mondo sociale con (e dopo) Bourdieu. CUEC, Napoli

De Obesso, M., & Nu~nez-Canal, M. (2021). El modelo educativo h!ıbrido: una respuesta necesaria de la ense~nanza universitaria a partir del COVID. COVID-2019 IMPERATIVO PARA EL CAMBIO. Ed. Tirant Lo Blanch.

Demuyakor, J. (2020). Coronavirus (COVID-19) and online learning in higher institutions of education: a survey of the perceptions of Ghanaian international students in China. Online Journal of Communication and Media Technologies 10(3), e202018.

Díaz-García, V., Montero-Navarro, A., Rodríguez-Sánchez, J-L. and Gallego-Losada, R. (2022). Digitalization and digital transformation in higher education: A bibliometric analysis, Front. Psychol. 13:1081595. doi: 10.3389/fpsyg.2022.1081595

Dysart, S., & Weckerle, C. (2015. Professional development in higher education: A model for meaningful technology integration. Journal of information technology education: Innovations in practice, 14(1), 255-265.

Education and Training Foundation (2019). Taking learning to the next level: Digital Teaching Professional Framework. Full reference guide. The Education & Training Foundation. www.et-foundation.co.uk/supporting/edtech-support/digital-skills-competency-framework/

Englund, C., Olofsson, A. D., & Price, L. (2017. Teaching with technology in higher education: understanding conceptual change and development in practice. Higher Education Research & Development, 36(1), 73-87. doi:10.1080/07294360.2016.1171300

Esteve-Mon, F. M., Llopis-Nebot, M. A., & Adell-Segura, J. (2020). Digital teaching competence of university teachers: A systematic review of the literature. Revista Iberoamericana de Tecnologias del Aprendizaje, 15(4), 399–406. https://doi.org/10.1109/RITA.2020.3033225

Esteve- Mon, F. M., Postigo- Fuentes, A. Y., & Castañeda, L. (2022). A strategic approach of the crucial elements for the implementation of digital tools and processes in higher education. Higher Education Quarterly, 00, 1–16. https://doi.org/10.1111/hequ.12411

European Union (2018). Council Recommendation of 22 May 2018 on key competences for lifelong learning. Official Journal of the European Union, (pp. 1–13). Retrieved from https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018H0604(01)&rid=7.

European union (2006). Recommendation of the European Parliament and of the council of 18 december 2006 on key competences for lifelong learning (cf. https://eurlex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF)

Falloon, G. (2020). From digital literacy to digital competence: The teacher digital competency (TDC) framework. Educational Technology Research and Development, 68, 2449–2472. https://doi.org/10.1007/s11423-020-09767-4

Fishbein, M., & Ajzen, I. (1975). Belief, Attitude, Intention, and Behavior: An Introduction to Theory and Research. Reading, MA: Addison-Wesley.

Garrison, D.R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2-3), 87-105. http://doi.org/10.1016/S1096-7516(00)00016-6

Garrison, D.R., Anderson, T., & Archer, W. (2001). Critical Thinking, Cognitive presence, and Computer conferencing in Distance Education. American Journal of distance Education, 15(1): 7-13. https://doi.org/10.1080/08923640109527071

Garrison, D.R. & Archer, W. (2003). A community of Inquiry Framework for Online Learning. In M. Moore (Ed.), Handbook of distance education. Erlbaum.

Ghomi, M., & Redecker, C. (2019). Digital competence of educators (DigCompedu): Development and evaluation of a self-assessment instrument for teachers' digital competence. In H. C. Lane, S. Zvacek, & J. Uhomoibhi (Eds.), Proceedings of the 11th International Conference on Computer Supported Education (vol. 1, pp. 541–548). SCITEPRESS. https://www.scitepress.org/PublicationsDetail.aspx?ID=1ClTvMhd8n4=&t=1

Granata (2015). Higher Education Authority (HEA) (2019). Digital transformation and empowering technologies in higher education. Future Focus Forum. Available at: https://hea.ie/assets/uploads/2017/04/190212_FutureFocus_Digital-Transformation_Discussion-Paper.pdf.

Harasim, L. (2017). Learning Theory and Online Technologies. New York: Routledge.

Jakoet-Salie A. andRamalobe K. (2023). The digitalization of learning and teaching practices in higher education institutions during the Covid-19 pandemic. Teaching Public Administration, vol.41 (I) pp.59-71, sage. DOI: 10.1177/01447394221092275

Hero, JL., (2020). Exploring the principal's technology leadership: Its influence on teachers' technological proficiency. International Journal of Academic Pedagogical Research, 4(6), 4–10.

Huda, M., Maseleno, A., Shahrill, M., Jasmi, K. A., Mustari, I., & Basiron, B. (2017). Exploring adaptive teaching competencies in Big Data era. International Journal of Emerging Technologies in Learning, 12, 68–83. https:// doi. org/ 10. 3991/ ijet. v12i03. 6434

Kopcha, T. J., Ding, L., Neumann, K. L., & Choi, I. Teaching technology integration to k-12 educators: A 'Gamified'approach. TechTrends, 60(1), 62-69. (2016).

Kundu, A., & Dey, K. N. (2020). An empirical study on the correlation between teacher efficacy and ICT infrastructure. The International Journal of Information and Learning Technology, 37(4), 213–238.

Kuzminska, O., Mazorchuk, M., Morze, N., Pavlenko, V., Prokhorov, A. (2018). Digital competency of the students and teachers in Ukraine: Measurement, analysis, development prospects. In: Proc. 14th international conference ICTERI. Proceedings, 2104, vol II: Workshops. CEUR workshop. Kyiv Ukraine, May 14–17, 2018, p 366–379.

JISC. (2019). JISC teacher profile (higher education). https:// repos itory. jisc. ac. uk/ 7283/1/ BDCP-HET- Profile- 110319. pdf

INTEF. (2017). Common Digital Competence Framework for Teachers – September 2017. Ministry of Education, Culture and Sport.

ISTE. (2018). ISTE Standards for Education Leaders. Retrieved from https:// www. iste. org/ stand ards/ foreducation- leade rs. Accessed 20 Oct 2021.

Ladeveze, L. N., & N!u~nez-Canal, M. (2018). Papel del profesor motivado en la educaci!on

emprendedora en Espa~na. Revista Empresa y Humanismo, XXI(1), 7–40. https://doi.org/10.

15581/015.XXI.1.7-40

Law, N., Woo, D., De, l. T. J. and Wong, K. 2018. A global framework of reference on digital literacy skills for indicator 4.4.2. Paris, UNESCO. Available at: http://uis.unesco.org/sites/default/files/documents/ip51-global-framework-reference-digital-literacy-skills-2018-en.pdf (Accessed 4 April 2022.)

López-Belmonte, J., Pozo-Sánchez, S., Fuentes-Cabrera, A., & Trujillo-Torres, J. M. (2019). Analytical competences of teachers in big data in the era of digitalized learning. Education Sciences, 9, 177. https:// doi. org/ 10. 3390/ educs ci903 0177

Lyon, J. A., & Magana, J. A. (2020). Computational thinking in higher education: A review of the literature.

Computer Applications. Engineering Education, 28, 1174–1189. https:// doi. org/ 10. 1002/ cae. 22295

Magen-Nagar, N. and Shonfeld, M. (2017). The impact of an online collaborative learning program on students' attitude towards technology. Interactive Learning Environments, 26(1), 1–17.

Maltese, V. (2019). Digital transformation challenges for universities: ensuring information consistency across digital services. Cataloging and Classification Quarterly 56(1), 1–15.

Mandinach, E.B.; Gummer, E.S. (2013). A systemic view of implementing data literacy in educator preparation. Educ. Res., 42, 30–37.

Marcelo, C., & Yot-Dom!ınguez, C. (2019). From chalk to keyboard in higher education classrooms: changes and coherence when integrating technological knowledge into pedagogical content knowledge. Journal of Further and Higher Education, 43(7), 975–988. https://doi.org/10.1080/0309877X.2018.1429584

Menendez, FA, Maz-Machado, A. and Lopez-Esteban, C. (2016). University strategy and digital transformation in higher education institutions. A documentary analysis. International Journal of Advanced Research, 4(10), 2284–2296.

Morgan, A., Sibson, R. & Jackson, D. (2022). Digital demand and digital deficit: conceptualizing digital literacy and gauging proficiency among higher education students, Journal of Higher Education Policy and Management, 44:3, 258-275, DOI: 10.1080/1360080X.2022.2030275

Morselli, D. (2019). The change laboratory for teacher training in entrepreneurship education: A new skills agenda for Europe. 144. Springer Nature. https://doi.org/10.1007/978-3-030-02571-7

Mutisya, S. M. (2020). Integration of information communication technology in teaching: The underpinning factors among Kenya's primary school teachers. Journal of Learning for Development, 7(2), 174–189.

Ng, W. (2012b). Can we teach digital natives digital literacy? Computers & Education, 59(3), 1065–1078. doi:10.1016/j.compedu.2012.04.016

Kravchuk, O., Tsyselska O., Buriak B., Nataliia Miatenko N., Volodymyr Mironov V. (2022). Application of Digital Technologies in University Education: Conceptual and Analytical Approach. IJCSNS International Journal of Computer Science and Network Security, VOL.22 No.1, January 2022. https://doi.org/10.22937/IJCSNS.2022.22.1.62

OECD (2015). Students, Computers and Learning: Making the Connection. PISA: OECD Publishing. Available at: http://dx.doi.org/10.1787/9789264239555-en.

Oliver, B., & Jorre de St Jorre, T. (2018). Graduate attributes for 2020 and beyond: Recommendations for Australian higher education providers. Higher Education Research & Development, 37(4), 821–836. doi:10.1080/07294360.2018.1446415

Oliver, E. (2014).Theological education with the help of technology. HTS: Theological Studies, 70(1),1–7.

OECD. (2005). The definition and selection of key Competencies. Paris.

Paino, M., Renzulli, L. A. (2012). Digital Dimension of cultural Capital: The (In)visible advantages for students who exhibit computer skills. Sociology of Education. 86, pp. 124-138

Pérez-Rivero, C. A., de la Mercedes de Obesso, M. & Núñez-Canal, M. (2022). Digital competence among university professors: analysis of the impact of the COVID crisis. Economic Research-Ekonomska Istraživanja, DOI: 10.1080/1331677X.2022.215585

Peters, M., Elasri-Ejjaberi, A., Martínez-Argüelles, M. J., & Fàbregues, S. (2022). Teacher digital competence development in higher education: Overview of systematic reviews. Australasian Journal of Educational Technology, 38(3), 122-139. https://doi.org/10.14742/ajet.7543

Pitzalis, M. (2016). Innovare a scuola: insegnanti, studenti e tecnologie digitali. Il Mulino, Bologna

PWC (2018). The 2018 Digital University: Staying Relevant in the Digital Age. Available at: http://www.pwc.co.uk/publicsector (Accessed 10 October 2021).

Ragnedda, M. (2018). Conceptualizing digital capital. Telematics and Informatics 35(8). pp. 2366–2375

Rampelt, F., Birnkammerer, H., R¨owert, R., et al. (2018). Opening up higher education in the digital age. On the potential to unite the social dimension and the digitalisation of higher education in Europe. Internationalisation of Higher Education–Developments in the European Higher Education Area and Worldwide (3), 27–42.

Redecker, C., & Punie, Y. (2017). European framework for the digital competence of educators: DigCompEdu (JRC107466). Publications Office of the European Union. http://publications.jrc.ec.europa.eu/repository/handle/JRC107466

Rychen, D. S., & Salganik, L. H. (2003). Key competencies for a successful life and a well-functioning society. OECD definition and selection of competencies final report, https://doi.org/

10.1080/2159676X.2012.712997

Rodríguez, M.L.; Pulido-Montes, C. (2022). Use of Digital Resources in Higher Education during COVID-19: A Literature Review. Educ. Sci., 12, 612. https://doi.org/10.3390/educsci12090612

Rogers, E.M. (2003). Diffusion of innovations. New York: Free Press

Rogers, D. L., (2000). A paradigm shift: Technology integration for higher education in the new millennium. AACE Review (formerly AACE Journal), 1(13), 19-33.

Salganik, L., Rychen, D., Moser, V., & Konstant, J. W. (1999). Projects on competencies in the OECD context: Analysis of theoretical and conceptual foundations. Swiss Federal Statistical Office

Seiler, M. and Fischer, JMF. (2021). Digital learning in schools: What does it take beyond digital technology? Teaching and Teacher Education 103.

Seres, L., Pavlicevic Vand Tumbas, P., (2018). Digital transformation of higher education: competing on analytics. In: Proceedings of INTED2018 conference 5th-7th March, Subotica: Serbia

Stolterman, E. and Fors, AC. (2004). Information technology and the good life. In: Kaplan B, Truex DP,

Wastell, D. et al. (eds) Information Systems Research: Relevant Theory and Informed Practice. London: Kluwer Academic Publishers, 687–692.

Stolze, A., Sailer, K. and Gillig, H. (2018). Entrepreneurial mindset as a driver for digital transformation–a novel educational approach from university-industry interactions. In: International Conference on Innovation and Entrepreneurship. Academic Conferences International Limited.

Subhash, S., & Cudney, E. A. (2018). Gamified learning in higher education: A systematic review of the literature. Computers in human behavior, 87, 192-206.

Swan, K. (2003). Learning effectiveness: what the research tell us. In: J. Bourne & J. C. Moore (Eds.), Elements of Quality Online education: Practice and Direction (pp.13-45). The Sloan consortium

TechCentral.ie (2018) Digital Transformation: A Necessary Disruption. Available at: https://www.techcentral.ie/digital-transformation-necessary-disruption/ (Accessed 10 October 2021).

Tondeur, V. K., Braak, V., & Valcke, M. (2008a). ICT integration in the classroom: Challenging the potential of a school policy. Computers & Education, 51(1), 212–223. https:// doi. org/ 10. 1016/j.compedu. 2007. 05. 003

Tondeur J.,· Sarah Howard, S.,· Manon Van Zanten, M., · Gorissen P.,·Van der Neut, I., · Uerz D., · Marijke Kral, M., (2023). The HeDiCom framework: Higher Education teachers' digital competencies for the future Education Tech Research Dev (2023) 71:33–53 https://doi.org/10.1007/s11423-023-10193-5

UNESCO. (2022). Digital Transformation of Higher Education Teaching and Learning, International Center for Higher Education Innovation under the auspices of UNESCO Institute of Education, Tsinghua University

UNESCO. (2020). COVID-19 response - hybrid learning: hybrid learning as a key element in ensuring continued learning. ED/PLS/2020/04/Rev.2. 64 p. https://unesdoc.unesco.org/search/344e98e4-5ddf-45eb-857c-20b811e2d8d4

UNESCO. (2018). UNESCO ICT competency framework for teachers. United Nations Educational, Scientific and Cultural Organization.

Van Dijck, J., Poell, T., de Waal, M. (2018). The Platform Society: Public Values in a Connective World. Oxford University Press: Oxford (tr. it., Boccia Artieri G., Marinelli A. (a cura di) (2019), Platform Society. Valori pubblici e società connessa. Guerini, Milano)

van Loon, A.-M., Coetsier, N., & Kral, M. (2018). Competentieset leren en lesgeven met ict. iXperium. www.ixperium.nl/onderzoeken-en-ontwikkelen/publicaties/competentieset-leren-en-lesgeven-met-ict/

Venkatesh, V., Thong, J. Y.L.; and Xu, X. (2012). Consumer Acceptance and Use of Information Technology: Extending the Unified Theory of acceptance and Use of Technology. MIS Quarterly, (36: 1) pp.157-178

Zhang, Y., · Adams D.,· Cheah Soon Lee, K. (2022). The relationship between technology leadership and teacher ICT competency in higher education. Education and Information Technologies 27:10285–10307, doi: https://doi.org/10.1007/s10639-022-11037-0

Zhang, Y., Adams, D., Cheah Soon Lee, K., (2022). Assessing academic staff's ICT integration in higher education: instrument development and validation. Journal computer Education, Springer, doi: https://doi.org/10.1007/s40692-022-00248-6

Wing, J. M. (2006). Computational thinking. Communications of the ACM, 49, 33–35. https:// doi. org/ 10.1145/ 11181 78. 11182 15