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.

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