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DIGITAL & DISTANCE LEARNING

Distance Education in COVID-19 Times
Challenges and Practices during the Pandemic
Blended & Mobile Learning
MOOCs & Open Educational Resources
Learning Management Systems & Virtual Learning Environments

INNOVATIVE EDUCATIONAL TECHNOLOGIES

AI, Chatbots & Robots
Virtual & Augmented Reality
Social Media in Education
Technology Enhanced Learning

TEACHER TRAINING & ED. MANAGEMENT

ICT & Digital Skills
Professional Development of Teachers
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ACTIVE & STUDENT-CENTERED LEARNING

Gamification & Game-based Learning
Experiential Learning
Problem & Project-Based Learning
Soft Skills Development
Pedagogical Innovations
Non-Formal Learning

ASSESSMENT, MENTORING & STUDENT SUPPORT

Assessment & Evaluation
Rethinking Assessment in COVID-19 Times
Feedback for Learning
Tutoring & Coaching
Student Support & Motivation

EDUCATIONAL STAGES & LIFE-LONG LEARNING

From Pre-school to Secondary Education
Vocational Training
Transition to the Job Market
Developing Entrepreneurship in Education
Life-Long & Workplace Learning

QUALITY & IMPACT OF EDUCATION

Quality in Education
Experiences and Challenges in Curriculum Design
Sustainability & Social Impact of Education
Education and Research
University-Industry Collaboration
Mobility & International Projects

MULTICULTURALITY & INCLUSION

Multicultural Education
Diversity Issues
Special Educational Needs
Inclusion in Education

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Maths & Statistics
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STEM Experiences

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MASTER'S IN CONSTRUCTION ENGINEERING: GAINING PROFESSIONAL REHABILITATION SKILLS

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Abstract

Among the main objectives of the Master's Degree in Construction Engineering at the University of the Basque Country (UPV/EHU) is skills development that facilitates the employability of students in the construction sector. The Master's curriculum incorporates competences connected to Sustainable Development Goals, some related to building rehabilitation, thereby avoiding consumption of new resources linked to new constructions. In-depth studies on building damage and possible remedial action to address their rehabilitation and to recover full functionality are part of the subject module Pathology and Rehabilitation Techniques. Even though widespread acceptance of the course content was registered among students, a new practical session was added last year. A lecturer now accompanies each group of students preparing a practical report. The students are then guided through the identification of construction pathologies and possible intervention techniques, taking into account the criteria of historical heritage conservation and sustainable development. Throughout this research work, the proposed methodology is analyzed, the advantages and disadvantages are discussed and the benefits are clarified.

Keywords: Teaching-learning, Learning achievement, Sustainability, Construction Engineering, Rehabilitation, Sustainable Development Goals.

1 INTRODUCTION

The Master's Degree in Construction Engineering at the University of the Basque Country (UPV /EHU) provides a professional training course with a multidisciplinary vision of construction. The three areas covered by the Master's program merge building and civil works: design and calculation of structures, facilities, and project management [1].

In this sense, the training program reinforces both professional qualifications and the necessary competencies for planning and constructing urban infrastructure and facilities, and for their maintenance. It integrates urban, environmental, and sustainability parameters in the development of projects, following criteria relating to professional ethics and social, human, and economic analysis within the framework of its activities. Given that it is a transversal Master's course, there are students from various countries with different backgrounds and degrees. This cosmopolitan atmosphere enriches the course, because students have to work alongside classmates with different trainings and different visions of the processes and constructive solutions.

Governments, private organizations, and researchers have focused on buildings, infrastructures, and urban developments. This attention is justified, due the effects of the construction sector on the natural environment that entails major social, economic, and cultural implications [2]. Universities can play a crucial role in the development of Sustainable Development Goals (SDGs) and the promotion of sustainability, seeing them as opportunities [3]. They are increasingly employed nowadays and used for the assessment of sustainability. SDGs are included in institutional mission statements [4] and are even incipient in university curricula [5]. And even more so, there are rankings for measuring the impact of SDGs within Universities [6]. Graduates capable of integrating the design and construction considerations of SDGs are needed in the construction sector [7].

Rehabilitation also plays a key role. Figure 1 shows the number of building licenses in Spain. A sharp decline in new building after the great crisis of 2008 can be observed, while the rehabilitation subsector has fewer variations in its activity and is more economically stable. Both rehabilitation and new construction can be done with the same tools and prior knowledge of the pre-existing constructive characteristics of each building. Specific knowledge is necessary to conduct a proper diagnosis of existing buildings and to provide the most appropriate solutions. It also influences new construction, avoiding designs that all too frequently hide flaws that are a cause of pathological processes [8].

Table 3. Answers to open questions. 2020/21 Academic Year.

Question	Answers
On the subject module, I have missed...	
	Group tours or case studies Seeing more in-depth solutions/more repair techniques Delving deeper into the subject. More repair methods, more generic knowledge, more examples Some more visits/some visits apart from the practical case / more visits More useful examples
Suggestions for the improvement of the subject:	
	Visit real cases On-site test in the building under study or in laboratory Longer subject More field visits to visualize all the topics covered More topics on fault repair and pathologies
Other suggestions:	
	It is enough for the subject and the teaching load Clear teacher and pleasant class Everything is fine Let's continue with this kind of Master's and hope that this subject continues with the same dynamic and professional ethics. More information in general

4 CONCLUSIONS

The methodology used to address student knowledge of failure diagnosis and rehabilitation within the scope of a Master's degree course on transversal construction has been described in detail. The analysis of case studies relating to construction pathology and rehabilitation has shown itself to be a useful tool for training students prior to future professional life. Rehabilitation is a part of the construction sector closely linked to the Goal of Sustainable Development and Heritage.

The teaching methodology has been refined after the teacher listened to the contributions of the students while accompanying them to the case studies that the student had previously identified. These changes in the teaching have been positively valued by the students. However, the comments of the students have also revealed new opportunities for improving the teaching-learning process.

The teaching team was very satisfied with the experience. Among the pluses to highlight were the involvement of students with case studies and the higher level of learning and involvement not only with purely engineering aspects, but also with those related to sustainability and heritage. However, this teaching method is very difficult to apply within large groups. A small group of students has proven to be a key aspect, which facilitated the teaching-learning process during the visits accompanied by a teacher.

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