Chapter 5
Bachelor and Master Engineering Theses:
Proof of Professional Competency

Alberto Cerezo-Narváez
https://orcid.org/0000-0003-1404-5771
University of Cadiz, Spain

MPaz Montero-Gutiérrez
University of Seville, Spain

Daniel Castro-Medina
https://orcid.org/0000-0003-0045-7935
University of Cadiz, Spain

Magdalena Ramírez-Peña
University of Cadiz, Spain

Daniel Sánchez-García
https://orcid.org/0000-0002-3080-0821
University of Cadiz, Spain

MCarmen Guerrero Delgado
https://orcid.org/0000-0002-6723-0463
University of Seville, Spain

Manuel Otero-Mateo
https://orcid.org/0000-0002-7778-577X
University of Cadiz, Spain

Andrés Pastor-Fernández
https://orcid.org/0000-0002-5265-9013
University of Cadiz, Spain

José Sánchez Ramos
University of Seville, Spain

ABSTRACT

Bachelor and Master engineering theses assess professional competencies. These theses evolved to meet professional demands, verifying a good preparation. Historically, Spanish engineering required rigorous final projects for professional practice, regulated by professional colleges to ensure quality. These works became formal curriculum subjects, in which students should demonstrate their skills and knowledge, addressing real sector needs and benefiting from industry collaborations. Without formal teaching to standardize these projects, tutors guide students in planning and problem-solving. This chapter presents a case study of an innovation project to simplify and virtualize theses processes in engineering degrees. The initiative provides virtual resources, standardized procedures, and equal opportunities, facing resource access issues and supervision variability. A virtual platform with training modules, guides, and mentoring programs benefits students and can model other universities. These deliverables enhance learning experiences, preparing them for successful careers.

DOI: 10.4018/979-8-3693-6915-9.ch005

Copyright ©2025, IGI Global Scientific Publishing. Copying or distributing in print or electronic forms without written permission of IGI Global Scientific Publishing is prohibited.

1. INTRODUCTION

University education in Spain in the fields of Engineering and Architecture has its roots in the process of industrialization and modernization that the country experienced between the 18th and 19th centuries. During this period, there was an urgent need for highly trained professionals who could design, build, and maintain vital infrastructure for economic and social development (Sebastián Pérez, 2003). In the case of Engineering, the establishment of the first technical schools was a fundamental milestone. From the first half of the 19th century, the first technical schools were created to train specialists in the construction and maintenance of transport and communication infrastructure and to prepare professionals to meet the growing demands of the national industry. In the second half of the 19th century and the early 20th century, more technical schools were established for other branches of engineering. As for Architecture, its teaching was initially linked to the fine arts academies in the mid-18th century, with a more artistic than technical approach. From the mid-19th century onwards, more technical and scientific training began to be provided, adapting to the needs of a transforming society.

To practice engineering and architecture professions in their early stages, it was essential to complete studies at an official technical school recognized by the State, which certified the technical training necessary for professional practice. These institutions were characterized by education that combined solid theoretical knowledge with a strong practical focus. Over time, professional licensing became another fundamental requirement, as professional associations regulated the practice of the profession, ensured compliance with ethical and technical standards, and defended the interests of their members. In the 20th century, the regulation of technical professions was strengthened, establishing specific requirements for professional practice, as outlined in the Law on the Regulation of Technical Education of 1957 (Head of State of Spain, 1957), which established the need to meet certain standards to practice as an engineer. Additionally, Law 2/1974 on Professional Associations (Head of State of Spain, 1974) established the requirement for professional licensing, granting professional associations legal personality and full capacity to fulfil their purposes.

From its inception, the importance of students demonstrating their skills and competencies through final projects was recognized, as these served as proof of their ability to apply knowledge in real-world contexts. The introduction of the Final Degree Project (PFC) had the fundamental purpose of proving that students had acquired the knowledge and competencies necessary to practice their profession autonomously and responsibly (Ortiz-Marcos & Ordieres-Meré, 2007). The PFC became an essential and mandatory element in student training, as it allowed them to integrate the theoretical and practical knowledge accumulated throughout their education and demonstrate their ability to carry out complete projects independently, applying them to a specific project that reflected the real demands and challenges of their professional field (Torralba Martínez, 2004). Professional associations played a crucial role in this process, reviewing and certifying the projects to ensure their quality and regulatory compliance. Therefore, this final project served not only as an academic assessment but also as a professional competency test before the relevant professional associations and bodies (Sanz Berzosa et al., 2008).

Starting with Law 2/1964 on the Reorganization of Technical Education (Head of State of Spain, 1964), the PFC was consolidated as a formal subject within the curriculum. Students were required to develop projects that integrated multiple disciplines and reflected the real needs of the market and society. Furthermore, thanks to Law 2/1974 on Professional Associations (Head of State of Spain, 1974), collaboration with industry and external companies increased, allowing students to work on more applied and relevant projects. This strengthened the connection between academia and the productive

34 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:
www.igi-global.com/chapter/bachelor-and-master-engineering-theses/365732

Related Content

The Effect of Psychological Safety on the Performance of Students in Graduate-Level Online Courses
George Hanshawand Jacob Hanshaw (2023). *International Journal of Innovative Teaching and Learning in Higher Education (pp. 1-21).*
www.irma-international.org/article/the-effect-of-psychological-safety-on-the-performance-of-students-in-graduate-level-online-courses/333864

Assessment of Theses in Design Education: Conceptualizing a Co-Creative Process for Grading by Automated Criteria Evaluation
Nina Svenningsson, Montathar Faraonand Victor Villavicencio (2021). *International Journal of Innovative Teaching and Learning in Higher Education (pp. 1-17).*
www.irma-international.org/article/assessment-of-theses-in-design-education/294567

Fostering English-Medium Instruction (EMI) Through Flipped Learning
Alberto Andujar (2020). *Teacher Training for English-Medium Instruction in Higher Education (pp. 340-355).*
www.irma-international.org/chapter/fostering-english-medium-instruction-emi-through-flipped-learning/250035

Repositioning Study Abroad as a Rite of Passage: Impact, Implications, and Implementation
David Starr-Glass (2016). *Handbook of Research on Study Abroad Programs and Outbound Mobility (pp. 89-114).*
www.irma-international.org/chapter/repositioning-study-abroad-as-a-rite-of-passage/164114

It All Works Out in the End: The Experience of Researching Online Language Classes
Rebecca Lynn Chismand Carine Graff (2021). *Overcoming Fieldwork Challenges in Social Science and Higher Education Research (pp. 73-94).*
www.irma-international.org/chapter/it-all-works-out-in-the-end/266665