Building Construction in the Architecture Degree: A Comparison of Curriculums in Spain

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Received: May 10, 2024 Accepted: August 14, 2024 Online Published: January 7, 2025

doi:10.5430/jct.v14n1p1 URL: https://doi.org/10.5430/jct.v14n1p1

Abstract

The Architecture Degree in Spain is regulated by Order EDU 2075/2010. This Order confers Architecture Schools in Spain freedom when organising their study programmes because it only indicates a minimum number of credits.

This work aims to compare the study programmes of 33 Architecture Schools in Spain because very few works have addressed such programmes. Firstly, the relevance of each module was analysed by identifying the knowledge areas to which more importance is attached. In this case, the Design and Technical modules appeared with teaching loadings of more than 50% and 25%, respectively, compared to all the degrees, and differences of more than 45% were detected. In a second phase, the analysis centred on Building Construction courses (core and optional), their number of ECTS and course contents. This revealed that a series of disciplines is taught in practically all such schools in Spain, while others are taught less frequently and only in some Architecture Schools. Relevant differences (up to 75%) were found in the number of ECTS appointed to the Building Construction area among the different schools.

On the one hand, this comparison allows the training structure of the Architecture Degree in Spain and any existing differences among centres in the same country to be known. It also demonstrates the importance of Building Construction courses in Spanish architects' technical training. On the other hand, this work allows a framework to be defined to establish future analyses by comparing this organisation to that in other countries.

Keywords: architecture degree, Spain, building construction, curriculums, study programme

1. Introduction

Statistics from the Architects' Council of Europe (ACE) show a very inhomogeneous distribution of architects in different European countries (Mieg & Oevermann, 2021). Behind Italy (152,200) and Germany (117,500), Spain is the third European country with more architects (47,600) according to the ACE report published in 2020: "*The Architectural Profession in Europe*" (ACE, 2020). Conversely, countries like France, Poland, Latvia, the United Kingdom or the Netherlands have fewer architects and a ratio of lower than 0.6 architects per population of 1,000 (Figure 1a) (in Spain, this ratio comes close to 1 architect per population of 1,000). On the contrary, and according to the same report, Spain is one of the countries with a lower value of architectural market per architect, which is between 4- and 6-fold lower than that of other European countries like Norway, Sweden or the Netherlands, as shown in Figure 1b (Mieg & Oevermann, 2021).

This situation has led many Spanish architects to migrate to other European countries to seek better conditions. According to the last Spanish Syndicate of Architects report (Sindicato de Arquitectos de España, 2013), the main countries that welcome these professionals are Germany, the United Kingdom, Switzerland, Belgium, France and the Netherlands. In Europe, Spanish architects are highly valued for their competences that, in other countries, are collective competences from several professions: architect, building engineering and landscaping (Sagarra Trias,

2009). To understand this difference, it is necessary to analyse the structure of the Architecture Degree in Spain.

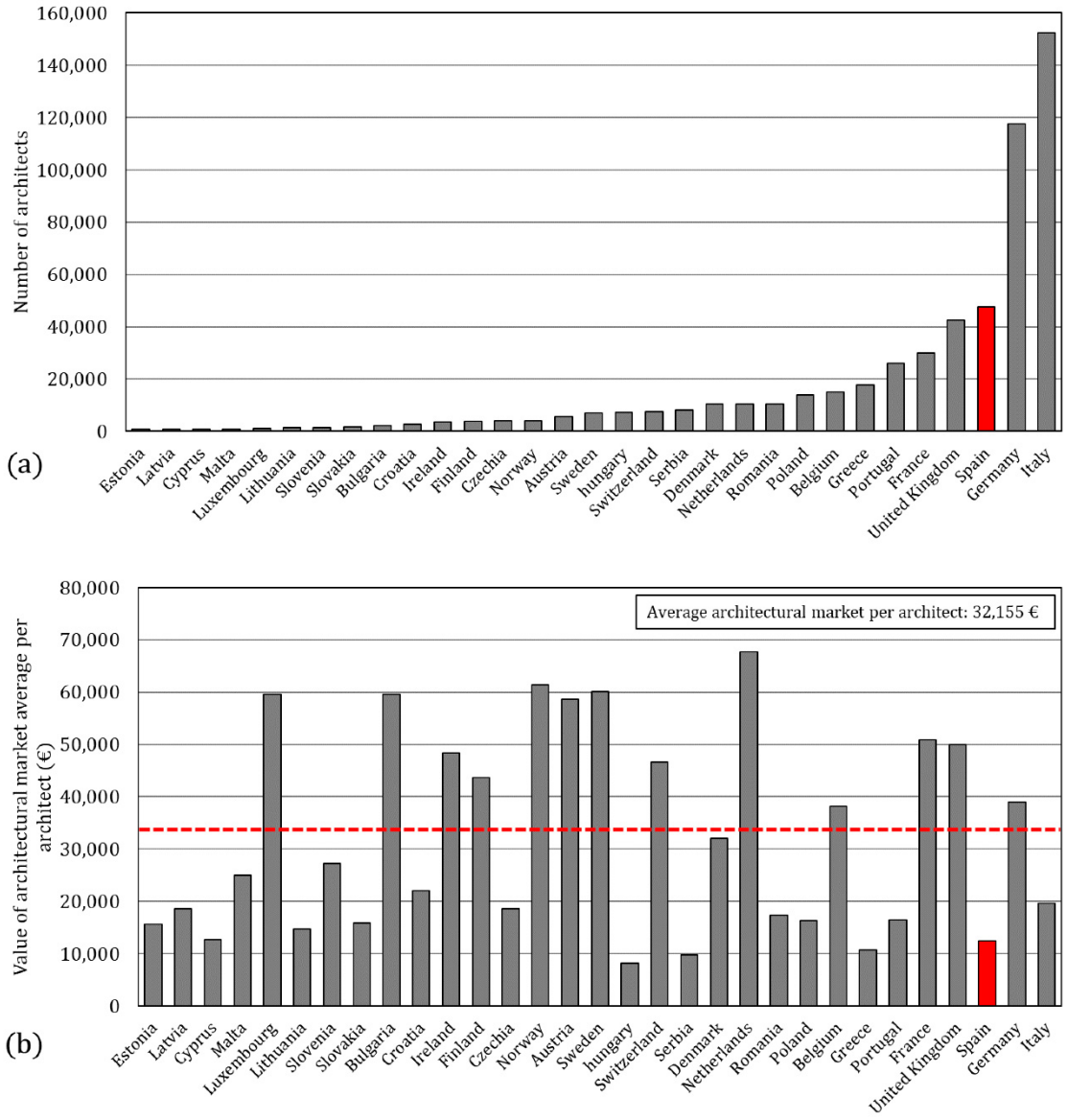

Figure 1. (a) Number of Architects and (b) Value of Architectural Market per Architect (statistics from 2020)

Another characteristic that distinguishes the Spanish training system is its structure because, in this case, it is divided by schools. In the United Kingdom, accreditation to become an architect involves a private association, the RIBA (Royal Institute of British Architects), by means of the studies of the RIBA-validated course, which then grants the right to licensing by the Architects Registration Board (ARB). Conversely, the structure in Spain differs. Architecture Schools teach professional degrees, which allow them to be issued a licence by registering with the Official Architecture School (COA in Spanish) in this case. To regulate the training acquired at Architecture Schools in Spain, ANECA (National Agency for Quality Assessment and Accreditation) is the agency that corresponds to the Spanish Government (Spanish Ministry of Education) and is in charge of periodically evaluating all the study programmes of each school. To devise study programmes, in 2010 the Spanish Ministry of Education passed Order EDU/2075/2010, which sets out the requirements to verify official university degrees applied for exercising the Architect profession (Ministerio de Educación, 2010). This document sets out the general structure of architecture studies and involves 360 European credits (ECTS, European Credit Transfer System), composed of a double degree with a Bachelor's degree (300 ECTS) and a Master's degree (60 ECTS). In turn, this document divides the training of both degrees into

a series of modules to which a minimum number of credits is appointed, as shown in Table 1. This Order also points out the general competences that students must acquire in each module. With this information, Architecture Schools in Spain can arrange their study programmes with a certain degree of freedom, which has led to differences appearing in the programmes of each school.

Table 1. Division by Modules and the Minimum Number of European Credits Defined in Order EDU/2075/2010 (Ministerio de Educación, 2010)

	Module	Minimum ECS required
Degree	Propaedeutic: Basic Sciences and Graphic Expression	60
	Technical: Building Construction, Structures, Facilities	60
	Design: Building Design, Urban Design, Architectural Composition	100
	Degree Thesis	6
	Total (Degree)	226 (300)
Master	Technical: Building Construction, Structures, Facilities	8
	Design: Building Design, Urban Design, Architectural Composition	12
	Graduation Thesis	30
	Total (Master)	50 (60)

According to this arrangement, it is important to compare the structure of all the curriculums of the Architecture Degree in the different Architecture Schools of Spain. It is a very useful methodology to identify differences between curriculums, and many authors use it to compare either universities in different countries (Aytenew & Chen, 2021; Mottaghi & Talkhabi, 2019) or the evolution of the same curriculum over time (Diaz-Barriga & Barrón, 2014). However, the authors of this work did not find any study with these characteristics in the architecture field. A few international papers attempt to systematise the comparative studies of the university curriculum in their own nation. For example, Magaji and Ilyasu (2016) or Abubakar (2012) have attempted to identify differences among study programmes of Architecture Schools in Nigeria to demonstrate the need to unify criteria to establish a common curriculum that is inkeeping with this country's current and future needs. Alagbe et al. (2015) also analysed the case of the Architecture Degree in Nigeria, but focused on future professionals' competence rating. Olweny (2018) extended his research to different countries in East Africa, but focused on sustainability-related subjects. Like Olweny, some authors focus on analysing specific courses of the study programmes of the Architecture Degree. Pasin (2017) analysed the skill dichotomies in the Design Studio-Centred domain in three Architecture Schools in Turkey. Bayhan and Karaca (2020) also analysed the Architecture Degree in Turkey, but centred on the evolution of the study programmes of three different generations (1965-1979, the post-1980s generation and born after 2000) and how technological advances were implemented in each stage. Some authors centre on very important knowledge areas in architecture today, such as sustainability. Lee et al. (2012) carried out a survey in 36 South Korean schools to determine the extent of sustainability education in their programmes. The authors' study concluded the need to better integrate this matter into design studio courses to raise more student awareness about this topic. Rieh et al. (2017) performed a study in a broader context by analysing 48 schools in the same country that had been accredited by the Korea Architectural Accrediting Board (KAAB). Their analysis also revealed a particular weakness in integration between core sustainability courses and studies in most curriculums. Recently, Bertone et al. (2024) also focused on analysing subjects related to sustainability, but in a single centre (the GU University in Australia), and relating the contents of these subjects to Sustainable Development Goals (SDGs). Another study that centred on analysing courses related to sustainability is that by Wright (2003). It detected that sustainability was lacking in most study programmes in the USA and determined the need of the organisations that support and guide architecture education in this country to collectively move towards a much greater integration of sustainability into its pedagogy and practice.

Other authors focus on analysing regional architecture study programmes or even consider Architecture Schools in different continents. For example, the work by Ostwald and Williams (2008) completed a very extensive survey of the 20 schools accredited by the Australasia Association of Architecture Schools (AASA), with 16 in Australia, three in New Zealand and one in Papua New Guinea. By analysing each study programme, and by means of questionnaires and interviews, the authors classified all the courses into seven categories (design, technology, history and theory, communication, practice, environment, optional courses), and then compared the relative weight of each category in

the total by arranging data in two different periods: 1994 and 2006. This study permitted these authors to identify the main trends in different centres. As with the previous examples, other authors centre on analysing courses or specific contents. By means of surveys conducted with students from different Architecture Schools in Asia, Ahn and Kim (2016) analysed the implementation of BIM tools in their study programmes. Gu and Bries (2012) also compared the implementation of BIM, but in two specific cases, in one school in New Castle (Australia) and in another in Eindhoven (the Netherlands), to analyse two completely opposing approaches. In contrast, Barions and Toledo (2010) conducted a similar analysis, but focused on more than 20 universities in the USA. Saghafi and Crowther (2012) also analysed the study programmes of two schools, one at Queensland University (Australia) and another at the University of Tehran (Iran), to compare the role of technology courses in architecture education, and the different existing approaches: a clear focus on knowledge or the application and skills, particularly in design study projects. Related to sustainability in Architecture Degree programmes, Hopfe et al. (2017) performed a broader study in several Architecture Schools in Australia, India, the USA and the UK, by centring on analysing how Building Performance Simulation (BPS) is implemented in different study programmes. These authors established that no single method existed, not even in the same country. Numerous studies focus on comparing the implementation of sustainability or environmental awareness in Architecture Degrees of different countries; for example those by: Salama and Amir (2005), which centred on 18 schools from eight different Arab countries; Porras-Álvarez et al. (2016), which analysed the programmes of several Asian schools; Altomonte et al. (2010), which centred on the implementation of sustainable education in 69 European schools after the Bologna unification process. Boarin et al. (2020) also performed a similar analysis, but with three different schools in Oceania, America and Europe.

Very few works published to date have centred exclusively on Architecture Schools in Spain and their study programmes. López de Asiain et al. (2011) conducted an analysis of implementing sustainability courses in two Architecture Schools in Spain (Seville and La Coruña) after the Bologna Process. Apart from that, only Ruiz-Apilánez et al. (2015) and Mileto et al. (2015) have done studies to compare the Architecture Degree curriculums in the 33 Architecture Schools in Spain. In the first case (Ruiz-Apilánez et al., 2015), the authors only focused on urbanism courses and their importance in every centre. In the second case (Mileto et al., 2015), the authors centred only on subjects related to architectural heritage and its conservation. As for recently published works, only Domínguez-Gil et al. (2022) have done a study that focused on the training of architects in Spain. However, it does not focus on the training curriculum, but on an analysis of the socio-emotional competences that are developed in Architecture Degrees and Master's degrees in Spain. This is because professional activities in the architecture sector require specific skills that are not only technical, but also social.

Seeing that works that have gone further into the organisation of the different Architecture Schools in Spain are unavailable, this study presents a much more detailed comparison than that currently found in the bibliography. The objective of this work is to identify the differences among every study programme of the Architecture Degree taught at Architecture Schools in Spain. To do so, the 33 Architecture Schools that teach the Architecture Degree during academic year 2023-2024 were anslysed. This study identified the different blocks or modules into which the training in each centre is divided (nine modules), as well as the courses making up this degree. Finally, the authors did a profound analysis of the Technical module, Building courses, given its importance in the technical training of architects in Spain, as previously pointed out. To this end, core and optional courses, and their teaching load, were identified, as were the contents of these courses. This study allowed an overview of the training of architects in Spain to be obtained, and a framework to be established to make comparisons of the study programmes of foreign Architecture Schools.

2. Methodology

2.1 Curriculum Analysis of Spanish Universities

This study uses a systematic study programmes review. For this purpose, all the study programmes of the Architecture Degree in the 33 Architecture Schools of Spain taught during academic year 2023-2024 were consulted, which are published on the website of all these centres (see Table 2). As pointed out in the Introduction, the Architecture Degree in Spain is a double degree: Bachelor's+Master's degree. However, some centres only offer the Bachelor's degree either with 300 ECTS or 330 ECTS (indicated in Appendix A, Table A.1). This table also shows the website of each centre, the date its first study programme was passed and the date when its current study programme was passed.

With the study programme of each centre, a first analysis identified the teaching load of each subject by grouping them into nine modules: Technical, Basic Sciences, Projects and Practicums, Economics and Management, Graphic

Expression, Language, New Graphic Tools, Optional and Final Thesis. This division into modules was done after considering how courses were organised in the 33 centres in Spain. Table 2 provides details of the courses included in each module.

Table 2. Modules in Which the Course(s) Included in Each Modile Are Organised

Module	Courses included
Technical	Building Construction, Structures, Land Engineering and Foundations, Building Services
Basic Sciences	Mathematics, Physics
Graphic Expression	Architectural Forms, Drawing, Geometry
Projects and Practicum	Architectural Design, Urban Planning and Landscape, Composition, History, Restoration
Economics and Management	Economics, Business Management, Legal Architecture, Deontology, Ethics
New Graphic Tools	Advanced Computer Design
Language courses	Language courses: English, French
Optional	Optional Courses
Final Thesis	Degree Thesis and Graduation Thesis

2.2 Building Construction Courses

In a second phase, the comparative analysis centred only on the Building Construction courses given their importance in the technical training of architects in Spain. In this study, the curricular weight of these courses was analysed in relation to the whole degree in each school by identifying the number of ECTS appointed to this knowledge area. This analysis was done by distinguishing if courses were taught in the Bachelor's or the Master's degree, and if they were core or optional courses.

2.3 Building Construction Contents

Finally, a systematic review was done of the teaching guides of all the Building Construction courses defined in Section 2.2 to identify which disciplines and knowledge areas were the most or least frequently taught in this module. To do so, the total number of ECTS that the Architecture Schools in Spain appointed to each content type was taken into account.

3. Findings and Discussion

3.1 Curriculum Analysis of Spanish Universities

Figure 2 shows the number of ECTS that each study programme of the 33 Architecture Schools in Spain appoint to each module and block of courses. This is done according to the division presented in Table 3 for academic year 2023-2024. Figure 3 depicts the same data, but as a percentage (teaching load (ECTS) in relation to the total credits for a degree). In both graphs, the 33 schools are grouped into three large blocks, those that offer the Bachelor's+Master degree (D+M(360)), and those that offer only the Bachelor's degree, regardless of them having a teaching load of 330 ECTS (D(330)) or 300 ECTS (D(300)).

As both Figure 2 and Figure 3 show, the courses with the heaviest teaching load correspond to Architectural Design courses, in which students do their first projects and designs. They are distributed over the 5-6 years that the degree lasts and are eminently practical. However, some differences of more than 22% were found among centres. The most representative case was the Universidad de Sevilla, where these courses sum a total of 146 ECTS, more than 40% of the degree. The opposite case was the Universidad Internacional de Cataluña with a teaching load of 53.5 ECTS, which represents less than 18% of the degree. When adding these Architectural Design courses to those of Urbanism, History and Composition, the Design block of Order EDU 2075/2010 was obtained (Ministerio de Educación, 2010). This document points out that the minimum teaching load must be 112 ECTS (100 in the Bachelor's Degree, 12 in the Master's degree). At those universities whose degree has 300 ECTS, the teaching load of this block exceeded 130 ECTS (more than 44% of the degree). This block at those universities offering only the degree with 330 ECTS exceeded 170 ECTS (more than 50%). At the remaining 24 universities, which offered the double Bachelor's+Master's degree, the average load to the Design block was 182 ECTS, which is well over the minimum 112 set out in Order EDU 2075/2010 (Ministerio de Educación, 2010). This represents more than half the teaching load of both degrees.

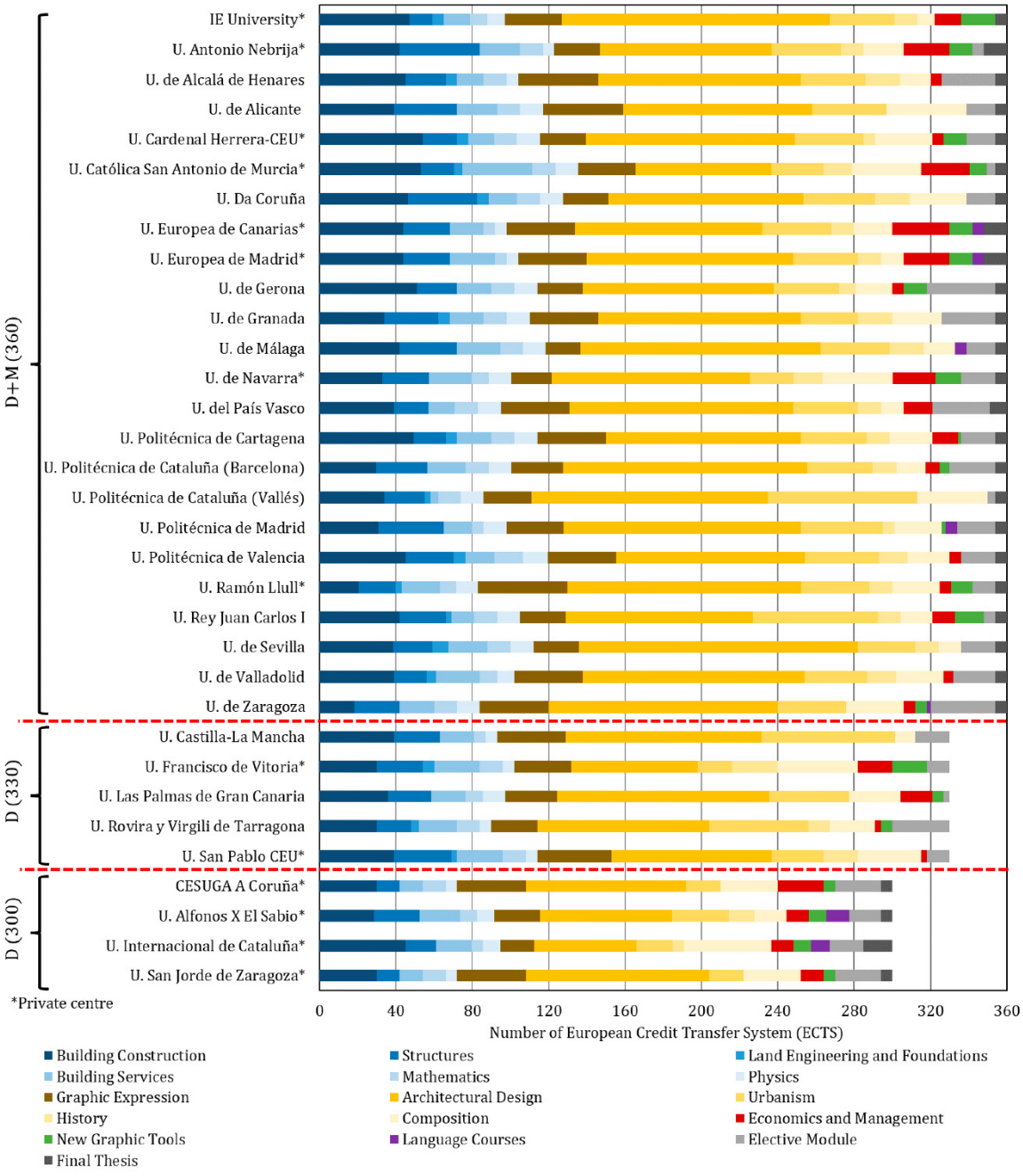

Figure 2. Number of ECTS per Module and Block of Courses in Each Study Programme of the Architecture Schools in Spain

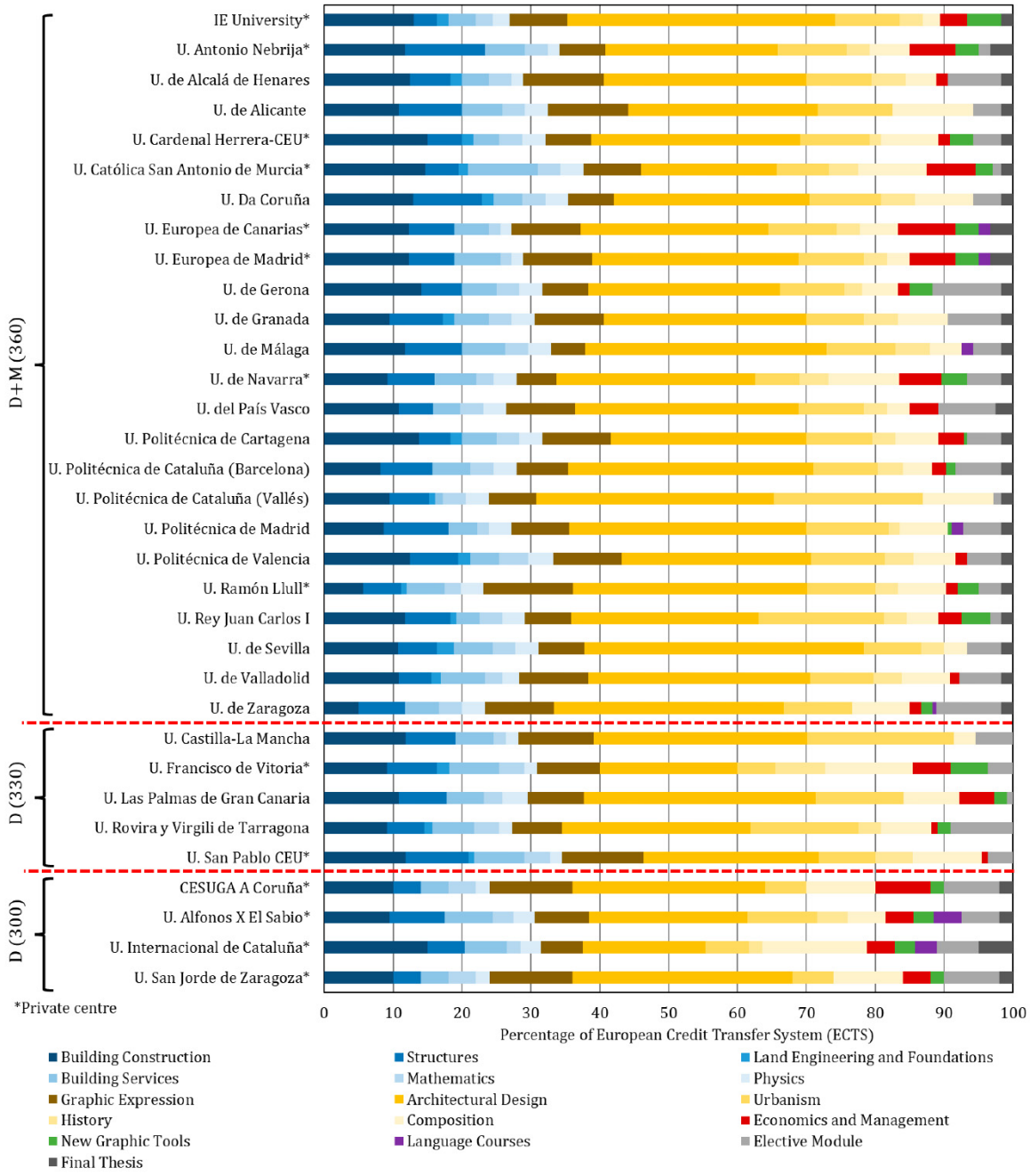

Figure 3. Percentage of ECTS per Module and Block of Courses in Each Study Programme of the Architecture Schools in Spain

The Technical module, which includes the Building Construction, Structures, Land Engineering and Foundations and Building Services courses, was also found to be important in the Architecture Degree. Training in this knowledge area is a characteristic that distinguishes the training given in Spain from that taught in other European centres. This block had an average teaching load of 82 ECTS, which represents almost 25% of the whole degree. Nonetheless, differences of more than 45% appeared among schools: the Universidad San Jorge de Zaragoza teaches 60 ECTS (the minimum number set out in Order EDU 2075/2010 (Ministerio de Educación, 2010)), but with more than 110 ECTS in other centres, such as the Universidad Católica San Antonio de Murcia.

The Mathematics and Physics courses, which are grouped in the Basic Sciences module, as well as those that centre

on Graphic Expression, have a much lighter teaching load with between 30 and 60 ECTS. These subjects are mainly taught in the first two-degree courses. They aim to transmit the necessary skills to be applied in the following years for the courses of the Technical and Design modules.

The organisation of the Degree Thesis block is similar at all the universities in Spain. This module includes the Degree Thesis and Graduation Thesis courses, which have a teaching load of 6 and 30 ECTS, respectively, at most centres, conditioned mostly by Order EDU 2075/2010 (Table 1) (Ministerio de Educación, 2010). These data coincide with those published recently by Domínguez-Gil et al. (2022), which is the most recent work in the literature in this area.

Another interesting finding is the teaching load of the Economics and Management courses. This is not a very common area for European universities, but is quite important in Spain. This block is included in the core courses at 26 of the 33 centres where the Architecture Degree is taught, but its distribution is not uniform. At some schools, the teaching load in this knowledge area is 3 ECTS, but can be as much as 10-fold more in others (30 ECTS). However, the most striking finding was that private centres attach considerable importance to this block. In fact at private centres, the average teaching load is 17.65 ECTS, with less than half this, 8.05 ECTS, at public centres. Furthermore, those centres that do not include core courses in this area offer at least one course offered in optional courses whose teaching load varies between 3 and 6 ECTS. These data denote the orientation of training in private centres, which is clearly towards the organisation and management of private studies.

Finally, the block of courses found for working with New Graphic Tools should be analysed, which refer to those courses that centre on transmitting to students the skills needed to work with new digital tools like BIM. Not much importance is attached to this area, and it only appears in 20 of the 33 centres with teaching loads between 2 and 18 ECTS. As with the Economics and Management courses, most universities include courses that focus on this knowledge area in optional courses. This trend coincides with that reported by other authors at centres from other parts of the world like Europe, Australia (Gu & de Vries, 2012) or Asia (Ahn & Kim, 2016).

3.2 Building Construction Courses

3.2.1 Core Courses

As Section 3.1 points out, the Technical module is very important in the training of architects in Spain and represents more than 25% of the teaching load of the Architecture Degree. This block includes the Building Construction courses, which combine all those that focus on knowledge about building materials, building techniques, regulations and the design of building solutions. Figure 4 shows the teaching load in ECTS of the Building Construction courses that were taught during academic year 2023-2024 at the 33 Architecture Schools of Spain, and distinguishes between those taught in the Bachelor's degree and those in the Master's degree.

Once again, large differences appear among Architecture Schools. At the Universidad de Zaragoza, the teaching loading of the Building Construction courses is 18 ECTS, which is the opposite of the Universidad Católica San Antonio de Murcia with 67 ECTS between the courses of the Bachelor's and Master's degrees. This implies a difference of almost 75%. Despite these differences and having obtained the Bachelor's or Master's degree, students' professional competences are the same and, therefore, they can direct building works despite their more or less concise training. The average value of the ECTS for the Building Construction courses in all the centres in Spain is 49.5.

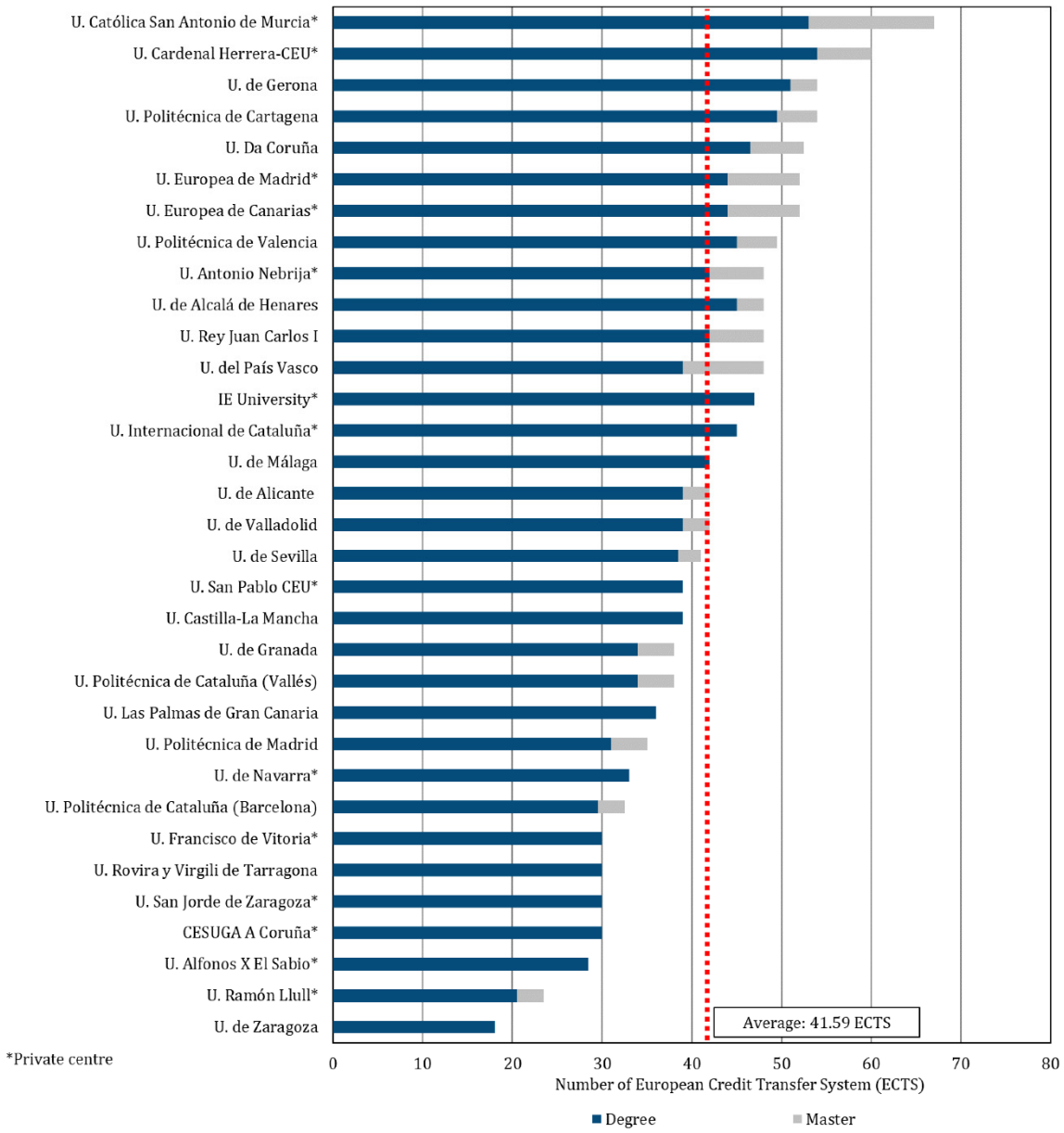

Figure 4. Number of Core ECTS of the Building Construction Courses (Bachelor's+Master) at the Different Architecture Schools of Spain

3.2.2 Optional Subjects

Figure 5 indicates which Spanish universities offered optional courses in the Building Construction area, and for both Bachelor's and Master's degrees, during academic year 2023-2024. This analysis differentiates offered courses that students can select and those which, for different reasons, were not taught during the above academic year, but were taught in previous years (not offered).

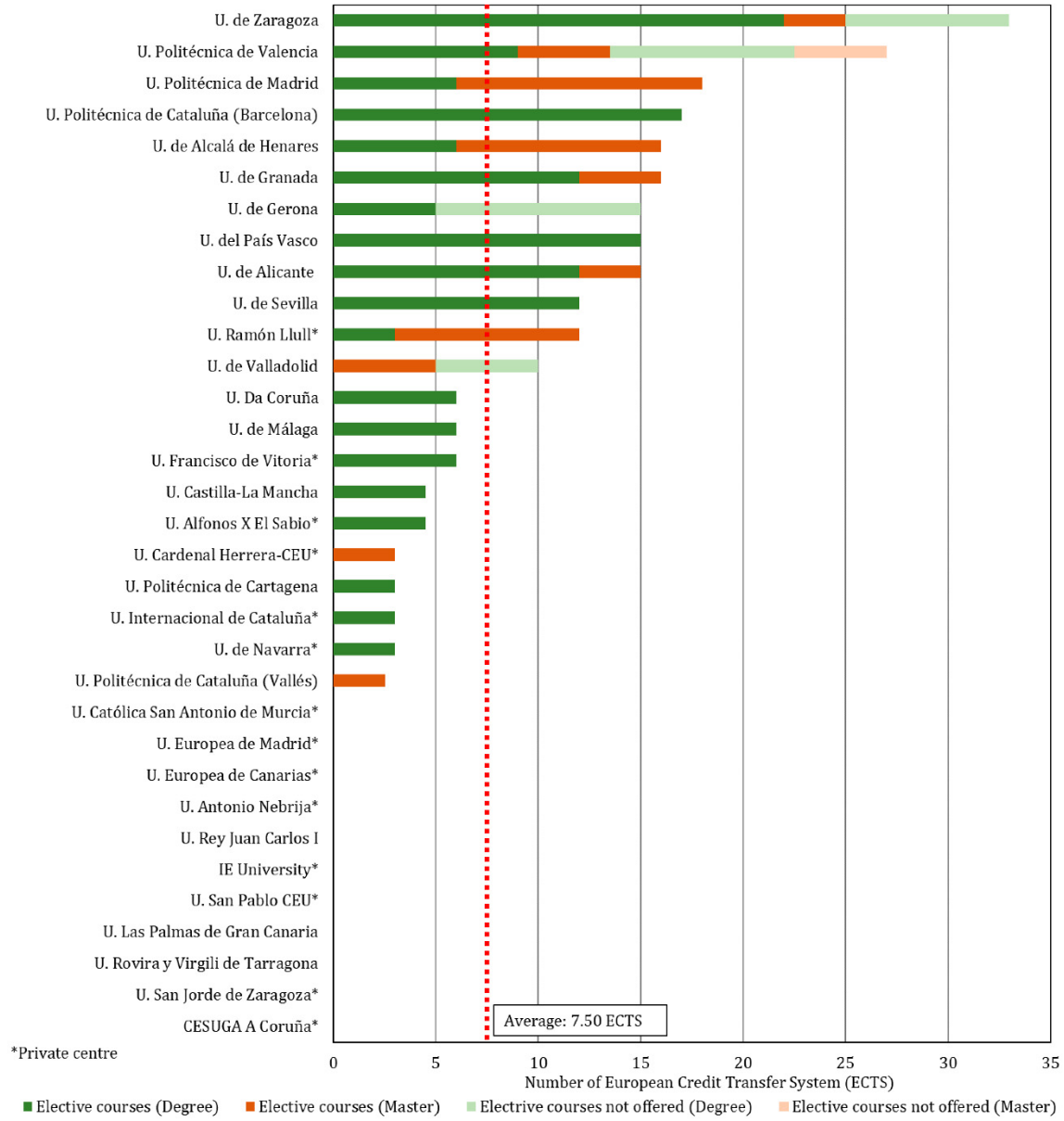

Figure 5. Number of Credits for Optional Construction Courses (Bachelor's and Master's degrees) at the Different Architecture Schools of Spain

As the data in Figure 5 reveal, not all the centres' study programmes include optional courses in the Building Construction area. Eleven centres, of which eight are private, do not include optional courses in this knowledge area. Of the remaining 22 centres, 12 only include optional courses in the Bachelor's degree, while only two do so in the Master's degree. The 10 remaining centres offer optional courses in their study programmes in the Building Construction area for both the Bachelor's and Master's degrees. Of them, the most significant case is the Universidad de Zaragoza with the fewest core ECTS for Building Construction (18). However, it offers the most optional ECTS, with 25 between Bachelor's and Master's degrees, which is 7.5 more than during academic year 2023-2024, which were not included in its academic programmes. All in all, the average ECTS for the optional courses in the Building Construction area at the 33 Spanish Architecture Schools is 7.50 ECTS.

3.2 Construction Courses Content

Figure 6 depicts a series of graphs that summarise the contents of the Building Construction courses. They are divided into four groups: common and more frequent contents (Figure 6a); contents that appear less frequently in the

different study programmes of Spain (Figure 6b); which materials are analysed in the Building Materials courses (Figure 6c); the more usual contents of optional courses (Figure 6d). These graphs display the number of ECTS appointed to all the contents when summing the ECTS of each study programme for all 33 Architecture Schools in Spain.

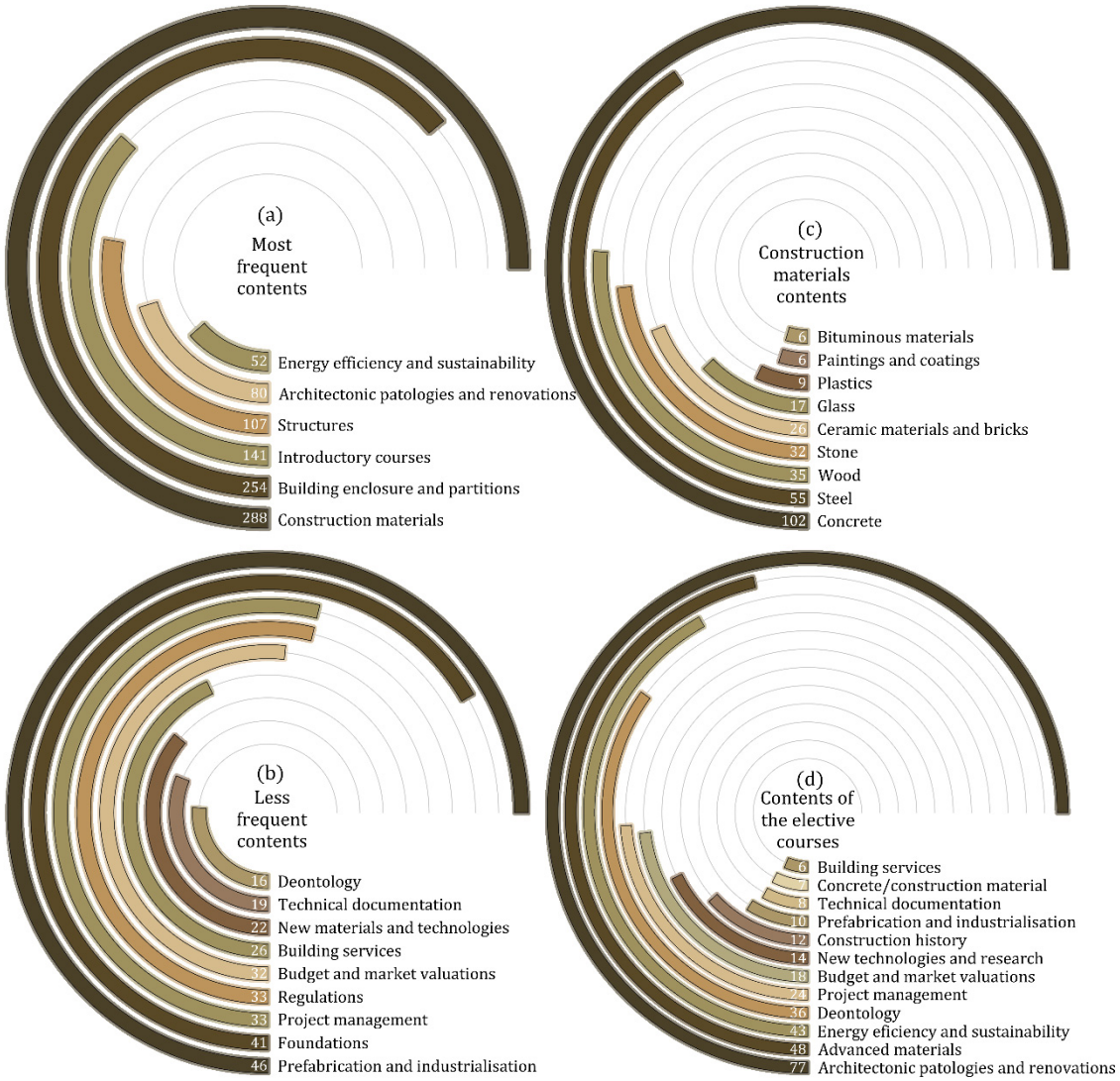

Figure 6. Contents of Building Materials at the Different Schools: (a) common and most frequent contents; (b) less frequent contents; (c) which materials are analysed in Building Materials courses; (d) the most usual contents of optional courses

As shown, the main content of the Building Construction courses is Building Materials (Figure 6a), where the principal characteristics of these materials tend to be defined, which are: their origin; their physical and mechanical properties; their durability. The most worked on materials are respectively concrete, steel and wood (Figure 6c), which correspond to the most widely used building materials today (Abed, Rayburg, Rodwell, & Neave, 2022). Another type of contents present at most centres is that used to define the design process and for constructing the building enclosure and interior partitioning. In this area, students acquire the skills they need to properly define enclosures using different building solutions by bearing in mind the regulations currently in force. At 26 of the 33 Architecture Schools in Spain, a mean between 3 and 6 ECTS is assigned to introductory Building Construction courses, which are normally taught in the first degree year. In most cases, the content of these courses aims to introduce students to the basic vocabulary, and to also present basic building units and set the bases for following academic years. Other frequently found contents in the Building Construction courses are those about the structural

analysis, but also those that centre on architectonic pathologies and renovations, energy efficiency and sustainability. Today the last two areas are the most professionally demanded according to last year's statistics provided by the Spanish Ministry of Transport, Mobility and Urban Agenda (Ministerio de Transportes, 2022).

Of the contents that least frequently appear (Figure 6b), the large number of ECTS appointed to study new materials and building systems, such as prefabricated or industrialised materials, stands out. This group also has a heavy teaching load in relation to Project Management and, also to drawing up budgets, by describing all the technical documents of a work or deontology.

The majority of these contents are less frequent in the Architecture Degrees of most European centres, which significantly distinguishes the training of Spanish architects because they have a very technical profile.

Optional courses are normally taught in the last year of the Bachelor's or Master's degree. They are offered so that students can learn in-depth the knowledge areas that they wish to specialise in. Their contents are more varied (Figure 6d), but the following areas also stand out: architectonic pathologies and rehabilitation, energy efficiency and sustainability, the analysis of new materials and technologies, and research in Building Construction. The teaching load in ECTS is also important when looking closely at anything related to the architect profession and Project Management.

4. Conclusions

The Architecture Degree includes a large number of courses (theoretical, practical, studio) in different areas (building design, graphic expression, basic sciences or technical concepts), through which knowledge is transferred to students and skills are developed by them. Analysing how all these components are organised in a study programme is important when investigating architectural education.

In order to understand architectural education in Spain, the authors conducted a systematic review of the Architecture Degree study programmes at the 33 Architecture Schools of Spain where academic year 2023-2024 was taught. This initial approach enabled the authors to develop a framework of the Building Construction curriculum in Spanish architectural education, and to find the most frequent contents of this area. The analysis allowed the following conclusions to be reached.

1- The training of architects in Spain comes as Bachelor's and Master's degrees. Order EDU 2075/2010 defines the minimum contents that must be taught by conferring Architecture Schools freedom to define their study programme. This condition has resulted in differences in centres. Architectural Design courses have the heaviest teaching load with between 20% and 40% of a degree. Those courses, and Urbanism, History and Composition courses, complete the Design module with between 40% and 50% of Spanish architects' training. Furthermore, training in the Technical module also has a substantial teaching load with 25% of the degree. This module includes the following courses: Building Construction, Structures, Land Engineering and Foundations and Building Services. Training in these areas distinguishes Spanish architects from others in Europe.

2- For the Building Construction area, the teaching load in Spain is a mean of 49.5 ECTS, albeit with differences of almost 75% among schools. These ECTS are organised as core courses, but also as optional courses.

3- The contents of Building Construction courses come in a wide range. Of the commonest however, the disciplines of Construction Materials and Building Enclosure and Partitions stand out. In both courses, basic knowledge of the most usual building materials is taught, and the skills needed to properly define enclosures and partitions are acquired by different building solutions according to the regulations currently in force. The most frequent contents also include those that focus on architectonic pathologies and renovations, and energy efficiency and sustainability, which are very much demanded areas professionally. They also have a substantial teaching load in optional courses, along with anything to do with Project Management, as well as disciplines like analysing new materials and technologies, and research in building construction.

The work reveals that there is a large difference in both subjects' content and weight. On the one hand, this allows each school to approach training from a different perspective. However, on the other hand, existing differences are large, and it is advisable to create new standards that allow greater unification of the training of architects in Spain. Order EDU 2075/2010 (Ministerio de Educación, 2010) needs revising after being in force for almost 15 years.

Finally, this study allows a framework to be established to make comparisons in future studies between the Architecture Degree in Spain and other centres or countries. Comparisons to schools in other countries will also make it possible to observe the differences in architecture graduates' skills in each country.

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Appendix A

List of the 33 Spanish centres where the Architecture Degree is taught.

This appendix contains a list of the 33 Spanish centres where architectural training was provided during academic year 2023-2024. This table also shows the website of each centre, the date when its first study programme was passed and the date when its current study programme was passed.

Table A.1. Spanish Centres Where the Architecture Degree Is Taught

University	Structure** (ECTS)	Website	Programme	
			First	Current
CESUGA A Coruña*	D (300)	*Degree: https://cesuga.com/plan-de-estudios-3/*	2004	2010
IE University*	D+M (360)	*Degree: https://www.ie.edu/es/universidad/estudios/oferta-academica/grado-estudios-arquitectura/el-programa/#plan-estudios* *Master: https://www.ie.edu/school-architecture-design/programs/master-in-architecture/study-plan/#study-plan*	1999	2022
Universidad Alfonso X el Sabio*	D (300)	*Degree: https://www.uax.com/titulaciones/grado-en-arquitectura*	1999	2007
Universidad Antonio Nebrija*	D+M (360)	*Degree: https://www.nebrija.com/carreras-universitarias/grado-arquitectura/#planEstudios* *Master: https://www.nebrija.com/programas-postgrado/master/arquitectura/#planEstudios*	2009	2016
Universidad de Alcalá de Henares	D+M (360)	*Degree: https://www.uah.es/es/estudios/estudios-oficiales/grados/asignaturas/index.html?codPlan=G258* *Master: https://posgrado.uah.es/es/masteres-universitarios/asignaturas/index.html?codPlan=M201*	1999	2013
Universidad de Alicante	D+M (360)	*Degree: https://web.ua.es/es/grados/grado-en-fundamentos-de-la-arquitectura/plan-de-estudios.html* *Master: https://web.ua.es/es/masteres/arquitectura/plan-de-estudios.html*	1984	2015
Universidad Cardenal Herrera-CEU*	D+M (360)	*Degree: https://www.uchceu.es/estudios/grado/fundamentos-arquitectura/plan-estudios* *Master: https://www.uchceu.es/estudios/posgrado/master-universitario-arquitectura/plan-estudios*	2002	2015
Universidad Castilla-La Mancha	D (330)	*Degree: https://www.uclm.es/estudios/grados/arquitectura*	2010	2010
Universidad Católica San Antonio de Murcia*	D+M (360)	*Degree: https://www.ucam.edu/estudios/grados/fundamentos-arquitectura-presencial/plan-de-estudios* *Master: https://www.ucam.edu/estudios/postgrados/master-arquitectura-presencial/plan-de-estudios*	2008	2008
Universidad Da Coruña	D+M (360)	*Degree: https://estudos.udc.es/es/study/detail/630G02V01#plan-structure* *Master: https://estudos.udc.es/gl/study/detail/4519V01#plan-structure*	1973	2015

*Private centre. **D-Bachelor's Degree or D+M-Bachelor's Degree +Master's Degree.

Table A.1. Spanish Centres Where the Architecture Degree Is Taught (continued).

University	Structure** (ECTS)	Website	Programme	
			First	Current
Universidad Europea de Canarias*	D+M (360)	*Degree: https://universidadeuropea.com/grado-fundamentos-arquitectura-canarias/#plan-de-estudios Master: https://universidadeuropea.com/master-arquitectura-madrid/#plan-de-estudios*	2013	2013
Universidad Cardenal Herrera-CEU*	D+M (360)	*Degree: https://www.uchceu.es/estudios/grado/fundamentos-arquitectura/plan-estudios Master: https://www.uchceu.es/estudios/posgrado/master-universitario-arquitectura/plan-estudios*	2002	2015
Universidad Europea de Madrid*	D+M (360)	*Degree: https://universidadeuropea.com/grado-arquitectura-madrid/#plan-de-estudios Master: https://universidadeuropea.com/master-arquitectura-madrid/#plan-de-estudios*	2001	2013
Universidad Francisco de Vitoria*	D (330)	*Degree: https://www.ufv.es/plan-de-estudios-grado-en-arquitectura/*	2006	2010
Universidad de Gerona	D+M (360)	*Degree: https://www.udg.edu/ca/estudia/Oferta-formativa/Graus/Fitxes?IDE=1348&ID=3105G1214#plaEstudis Master: https://www.udg.edu/ca/masters-en-tecnologia/arquitectura/pla-destudis*	2005	2013
Universidad de Granada	D+M (360)	*Degree: https://www.ugr.es/estudiantes/grados/grado-estudios-arquitectura Master: https://masteres.ugr.es/arquitectura/docencia/plan-estudios*	1995	2011
Universidad Internacional de Cataluña*	D (300)	*Degree: https://www.uic.es/ca/estudis-uic/arquitectura/grau-en-arquitectura#pla-d-estudis-i-equip-docent*	1996	2009
Universidad de Las Palmas de Gran Canaria	D (300)	*Degree: https://www2.ulpgc.es/plan-estudio/4039/40/estructuraporcursos*	1973	2016
Universidad de Málaga	D+M (360)	*Degree: https://www.uma.es/grado-en-fundamentos-de-arquitectura/info/116045/plan-de-estudios-de-fundamentos-de-arquitectura/ Master: https://www.uma.es/centers/courses_center/ets-de-arquitectura/5295/*	2005	2017
Universidad de Navarra*	D+M (360)	*Degree: https://www.unav.edu/web/grado-en-estudios-de-arquitectura/plan-de-estudios Master: https://www.unav.edu/web/master-universitario-en-arquitectura/doble-master-en-arquitectura-y-gestion-ambiental-de-edificios*	1964	2017
Universidad del País Vasco	D+M (360)	*Degree: https://www.ehu.eus/es/web/graduak/grado-fundamentos-arquitectura/creditos-y-asignaturas Master: https://www.ehu.eus/es/web/master/master-arquitectura/programa*	1977	2011
Universidad Politécnica de Cartagena	D+M (360)	*Degree: https://etsae.upct.es/plan-de-estudios/5191 Master: https://etsae.upct.es/plan-de-estudios/2372*	2008	2015

*Private centre. **D-Bachelor's Degree or D+M-Bachelor's Degree +Master's Degree.

Table A.1. Spanish Centres Where the Architecture Degree Is Taught (continued).

University	Structure** (ECTS)	Website	Programme	
			First	Current
Universidad Politécnica de Cataluña (Barcelona)	D+M (360)	*Degree: https://www.upc.edu/ca/graus/estudis-darquitectura-barcelona-etsab* *Master: https://www.upc.edu/ca/masters/arquitectura-barcelona-etsab*	1875	2015
Universidad Politécnica de Cataluña (Vallés)	D+M (360)	*Degree: https://www.upc.edu/ca/graus/estudis-darquitectura-sant-cugat-del-valles-etsav* *Master: https://www.upc.edu/ca/masters/arquitectura-sant-cugat-del-valles-etsav*	1973	2015
Universidad Politécnica de Madrid	D+M (360)	*Degree: https://etsamadrid.aq.upm.es/v2/es/estudios/grado/grado-en-fundamentos-de-la-arquitectura/curso-2022-2023/guias-de-aprendizaje* *Master: https://etsamadrid.aq.upm.es/v2/es/estudios/master/master-en-arquitectura/curso-2023-2024*	1848	2010
Universidad Politécnica de Valencia	D+M (360)	*Degree: https://www.upv.es/titulaciones/GFA/menu_1013973c.html* *Master: https://www.upv.es/titulaciones/MUARQ/menu_1013214c.html*	1964	2014
Universidad Ramón Llull*	D+M (360)	*Degree: http://www.salleurl.edu/es/estudios/grado-en-estudios-de-la-arquitectura/plan-estudios* *Master: http://www.salleurl.edu/es/estudios/master-universitario-en-arquitectura/plan-estudios*	1997	2011
Universidad Rey Juan Carlos I	D+M (360)	*Degree: https://www.urjc.es/estudios/grado/633-fundamentos-de-la-arquitectura#itinerario-formativo* *Master: https://www.urjc.es/estudios/master/1918-arquitectura#itinerario-formativo*	2011	2011
Universidad Rovira y Virgili de Tarragona	D (330)	*Degree: https://guiadocent.urv.cat/docnet/guia_docent/?centre=22&ensenyament=2220*	1991	2010
Universidad San Jorge de Zaragoza*	D (300)	*Degree: https://www.usj.es/estudios/grados/arquitectura/plan-estudios*	2009	2010
Universidad San Pablo CEU*	D (330)	*Degree: https://www.uspceu.com/oferta/grado/arquitectura/plan-estudios*	2001	2010
Universidad de Sevilla	D+M (360)	*Degree: https://www.us.es/estudiar/que-estudiar/oferta-de-grados/grado-en-fundamentos-de-arquitectura#edit-group-plani* *Master: https://www.us.es/estudiar/que-estudiar/oferta-de-masteres/master-universitario-en-arquitectura#edit-group-planificacion-de-la-ensena*	1958	2013
Universidad de Valladolid	D+M (360)	*Degree: https://www.uva.es/export/sites/uva/2.estudios/2.03.grados/2.02.01.oferta/estudio/e83592bf-72fd-11ec-ae63-00505682371a/* *Master: https://www.uva.es/resources/docencia/_ficheros/2020/559/asignaturas.pdf*	1968	2010
Universidad de Zaragoza	D+M (360)	*Degree: https://estudios.unizar.es/estudio/asignaturas* *Master: https://estudios.unizar.es/estudio/asignaturas*	2008	2013

*Private centre. **D-Bachelor's Degree or D+M-Bachelor's Degree +Master's Degree.

Acknowledgments

The authors thank the Spanish Government for Grant PID2020-119744RB-C21 funded by MCIN/AEI/10.13039/501100011033, and the support of the Universitat Politècnica de València. They are also grateful for the predoctoral scholarship granted to Josep Ramon Lliso Ferrando as part of the "Formación de Personal Investigador" programme of the Universitat Politècnica de València (FPI-UPV-2018).

Authors contributions

Dr. JRLF and Dr. MV were responsible for study design and revising. Prof. JRLF was responsible for data collection. Prof. JRLF drafted the manuscript and Prof. JMGR, AMI and MV revised it. All authors read and approved the final manuscript.

Funding

Not applicable.

Competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Informed consent

Obtained.

Ethics approval

The Publication Ethics Committee of the Sciedu Press.

The journal's policies adhere to the Core Practices established by the Committee on Publication Ethics (COPE).

Provenance and peer review

Not commissioned; externally double-blind peer reviewed.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Data sharing statement

No additional data are available.