

HISPANIC EDUCATION AND CULTURAL HERITAGE AT THE 1888 BARCELONA UNIVERSAL EXPOSITION: A UNIVERSITY PERSPECTIVE

*La educación y el patrimonio cultural hispano
en la Exposición Universal de Barcelona de 1888.
Una perspectiva universitaria*

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Keywords

Universal Exposition
Barcelona
Educational Heritage
International Education
Participation of Faculty
and Researchers

ABSTRACT: This work focuses the object of study on the advances presented by lecturers, researchers and universities at the 1888 Barcelona Universal Exposition, as part of the image of education and culture in its international projection. The historical method has been used for this purpose. The results were obtained by analysing the type of materials presented, the awards, their geographical origin and the main areas of knowledge to which they belonged. The sources included documentation centres and national archives. This work is part of an ongoing open research line and contributes new data to existing publications, investigating the active projection of this type of competition as part of a necessary overview.

Palabras clave

Exposición universal
Barcelona
Patrimonio Histórico-
Educativo
Educación internacional
Participación
de profesores e
investigadores

RESUMEN: El trabajo centra el objeto de estudio en los avances presentados a la Exposición Universal de Barcelona en 1888 por docentes, investigadores y universidades, como parte de la imagen de la educación y la cultura en su proyección internacional. Para ello se ha empleado el método histórico. Los resultados se han obtenido a partir del análisis del tipo de materiales presentados, los galardones, la procedencia geográfica y las principales áreas de conocimiento a las que pertenecen. Las fuentes proceden de centros de documentación y de archivos nacionales. El trabajo continúa una línea de investigación abierta y aporta nuevos datos a las publicaciones existentes, investigando la proyección activa de este tipo de certámenes como parte de una necesaria visión de conjunto.

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How to cite: Rubio-Mayoral, Juan-Luis; Trigueros-Gordillo, María-Guadalupe (2025). «Hispanic Education and Cultural Heritage at the 1888 Barcelona Universal Exposition: A University Perspective», *Cabás*, 34, 121-137. (<https://doi.org/10.1387/cabas.27686>).

Received: 08 July, 2025; Final version: 15 October, 2025.

ISSN 1989-5909 / © UPV/EHU Press



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1. INTRODUCTION

Among the exhibitions and fairs organised during the second half of the 19th century, the Universal Exhibitions initiated in London (1851) stand out. The diverse approaches to preserving and disseminating the value of educational heritage gave rise to dedicated educational museums (Greenhalgh, 1989). This research analyses the material participation of Spanish universities and their faculty at the 1888 Barcelona Universal Exposition, highlighting their internationalisation process and significance as educational heritage, nurturing university museology. The historical method and quantitative analysis of sourced data are employed to examine exhibitors, object typologies and geographical provenance, providing a preliminary assessment of the roles of educators and researchers at the event (Viera, 2013).

The amplification, transfer, and integration of innovations exhibited by a range of institutions via pedagogical material and practices alongside advancements in knowledge were the key factors driving the commercial success of 19th-century universal exhibitions. From their inception, these events were conceived as propaganda platforms for participating nations, presented through public Fairs. Their dynamism stemmed from mercantile logic, offering a diverse range of goods to meet the needs of Western societies' rapidly growing productive economies and foreign trade. The term 'universal' reflected the diversity of both the products exhibited and participating nations. The 1851 Great Exhibition in London successfully launched this model of society-orientated events, although industrial powers and Western colonial empires pursued different ends (Hauser & Vallotton, 2015).

In the case of the Barcelona Universal Exposition, propaganda was used to simultaneously showcase the finest Catalonian products and foster competitiveness among producers. This could help explain the earlier exhibitions that preceded the 1888 event. The General Exhibition of Barcelona was held in 1844, followed by the Exhibition of Industry, Arts, and Crafts in 1860, the Catalan General Exhibition in 1871 and the Catalan Products Exhibition in 1877. Similar events were held in other parts of the Iberian Peninsula, such as the Regional Exhibition of Galicia in 1875. Demonstrating technical progress and its application to production in Catalonia was an affirmation of the region's economic and social development, both domestically and internationally, paving the way to the creation of the 1888 Universal Exposition. This event launched the city of Barcelona onto the international stage, placing it alongside the great European metropolises. The exposition occupied an area of approximately 450,000 square metres, attracted two and a half million visitors and 556 exhibitors over five months (Prado, 2021).

It was the Galician entrepreneur Eugenio Rufino Serrano de Casanova (1841-1920), a resident of Paris, who in 1883 proposed holding the Exposition to promote the Spanish State while showcasing the economic and productive development sparked by the first industrial revolution. This process stimulated regional growth, consolidating Catalonia's industrial bourgeoisie and providing Barcelona with an architectural identity defined by constructive modernism. The organisational agreement with the City Council was signed on June 9th, 1885. Following King Alfonso XII's death on November 25th, 1885, political changes returned Francesc de Paula Rius i Taulet (1833-1890) to the position of city mayor, securing the city council's support for Serrano's proposal. To ensure that the Exposition would take place, Taulet leveraged parliamentary fiscal support, forging alliances between Barcelona's prominent political, academic, banking and industrial figures. However, Catalan nationalists such as Valentí Almirall opposed the project. The Exposition eventually ran from April 8th to December 9th, 1888 in Ciutadella Park, near the Ribera district, refurbished to this end. Urban reorganisation also transformed the Columbus Monument site in Portal de la Pau square, where Passeig de Colón meets La Rambla, adjacent to the present-day Moll de la Fusta.

Modernity and identity were two of the phenomena that coincided with the 1888 Exposition during the Restoration period in Catalonia (Mackay, 1989), as an expression of early alliances between economic capital and the bourgeois aristocracy, the driver of industry, commerce and culture as identifying characteristics of nationalist politics. Politically, the Restoration period (1874-1931) reinstated a parliamentary constitutional system, which restored the Bourbon dynasty to the throne. Following General Martínez Campos' *pronunciamiento (The Sagunto Pronouncement)* (1874), a period ensued during which Práxedes Mateo Sagasta's Liberals and Antonio Cánovas del Castillo's Conservatives took turns in power peacefully.

Culturally, the Catalan *Renaixença* influenced urban design through architects such as Lluís Domènech i Montaner and Josep Puig i Cadafalch, with the latter serving as President of the Mancomunitat de Catalunya (*the Commonwealth of Catalonia*) (Bohigas, 1973). Meanwhile, Enric Sagnier i Villavecchia, the architect of the Palace of Justice, descended from two elite commercial families. Industrialists such as the López, Güell and Milà families, patrons of Antoni Gaudí, and Baron Quadras blended their artistic sponsorship with nationalism through the Lliga Regionalista (Mackay, 1989, p. 63). The Exposition drew conceptual inspiration from its predecessors in London (1851, 1862), Paris (1855, 1867, 1878), Vienna (1873), Philadelphia (1876) and Melbourne (1888). Twenty-two nations took part in the Barcelona event.

2. METHODOLOGY

The educational heritage presented by Spanish universities at the 1888 Barcelona Universal Exposition has been studied using the historical research method and quantitative analysis tools. The objectives of the research were as follows:

- a) To identify the overall contribution made by Spanish universities
- b) To analyse the impact of Spain's presence in the press
- c) To identify the awards received
- d) To initiate research into the contributions made by the Spanish universities that took part in the exhibition.

Primary sources found in libraries and research centres in Spain were consulted for the study of this subject, notably the National Library and the National Historical Archive. The materials consulted were supplemented with reports from the International Jury, documents from some exhibiting institutions, the Exhibition catalogues (1888a, 1888b, 1888c, 1888d), legislation and periodicals.

A data collection instrument was developed to analyse the official classification of exhibitors, objects, exhibiting entities or individuals, object type, and awards or medals to provide concrete results. These findings were complemented with the investigation of Spain's participation in parallel events and the overall impact on public opinion. The variables analysed included exhibited objects and typology, participating provinces, exhibitor identification and awards received.

3. RESULTS

We posit that the 1888 Barcelona Universal Exposition played a significant role in developing national education systems by acting as a catalyst for pedagogical ideas and practices during Western nations'

consolidation of modern training systems spurred on by the First Industrial Revolution. It helped disseminate cutting-edge educational concepts, teaching materials, textbooks and methodologies, evidencing contemporary teaching trends. Notable among these were advances in science and in research materials, such as Santiago Ramón y Cajal's award-winning histological preparations, which were of undoubtedly value for the genesis of neuronal theory and later earned him the Nobel Prize in Physiology or Medicine from the Swedish Academy.

Furthermore, the Exhibition served as a platform where twenty-two participating nations showcased education's contribution to consolidating national identities. It highlighted the growing relevance of universal access to schooling as part of progress and citizenship ideals among politically, economically and culturally influential nations. In this context, industrialisation, made possible by scientific advances and technical development, influenced education policies by highlighting the necessity to incorporate these scientific and technical advancements into teaching systems and emphasising the need for citizens to be prepared for the demands of the productive system and for skilled labour to meet the requirements of new production models.

3.1. The Reality of the Exhibition

Shortly before the event's opening, scheduled for April 8th, 1888, specialist journals such as *El Monitor de Primera Enseñanza* reported that few exhibitors had applied for display spaces. Requests from public and private school teachers and boards of educational institutions across Spain remained limited despite high expectations for this exhibition sector. Issue 6 of the journal detailed the categories established by the Technical Commission of the General Council of the Barcelona Universal Exposition for objects intended to showcase the current state and progress of public education in Spain.

The solution was seen in the number of Barcelona-based exhibitors, as the result of a project initiated by Executive Board First Vice President Manuel Durán y Bas: 'to demonstrate Barcelona's intellectual forces through memoirs, books, journals, pamphlets, works of art and all materials that reveal or display these forces' (lit.) (Universal Exposition, 1888, p. 115). Organisers also anticipated that 'conferences and six congresses alongside the exhibitions of Modern/Retrospective Art, Sciences and Public Education' would lend the Exhibition 'a character of progress and advancement, demonstrating Spain's albeit slow harmonisation of moral and material advancement to emulate the glories of the most educated and advanced peoples' (lit.) (Universal Exposition, 1888, p. 116).

A total of 1,656 collective contributions came from Spanish organisations. Geographical analysis shows that Barcelona accounted for 38% and Madrid for 26% of exhibits, jointly representing 64.8% of the total. Granada province (5%) followed a long way behind, then Seville province (3.1%), with the Balearic Islands (2.8%) and Girona province (2.7%) close behind. The remaining provinces contributed barely 1% of exhibits each, as detailed in Table 1.

Table 1
 Distribution of Educational Contributions
 to the 1888 Barcelona Universal Exposition by Province

Province	Number	%	Province	Number	%
Barcelona	630	38.0	Almería	6	0.4
Madrid	444	26.8	Zamora	6	0.4
Granada	82	5.0	Cádiz	5	0.3
Sevilla	51	3.1	Gipuzkoa	5	0.3
Baleares	47	2.8	Huesca	5	0.3
Gerona	44	2.7	Isla de Cuba	5	0.3
Jaen	21	1.3	Lugo	5	0.3
Bilbao	20	1.2	Palencia	5	0.3
Vizcaya	20	1.2	Santander	5	0.3
Alicante	14	0.8	Segovia	5	0.3
Toledo	14	0.8	Valladolid	5	0.3
Logroño	13	0.8	Huelva	4	0.2
Málaga	13	0.8	Navarra	4	0.2
Oviedo	13	0.8	Pontevedra	4	0.2
Córdoba	12	0.7	Teruel	4	0.2
Mallorca	12	0.7	Valencia	4	0.2
Burgos	11	0.7	Álava	3	0.2
Tarragona	11	0.7	Cuenca	3	0.2
Ávila	10	0.6	León	3	0.2
Badajoz	10	0.6	Pamplona	3	0.2
Lérida	10	0.6	Santiago	3	0.2
Coruña	9	0.5	Canarias	2	0.1
Salamanca	9	0.5	Castellón	2	0.1
Gijón	8	0.5	Soria	2	0.1
Ciudad Real	7	0.4	Puerto Rico	1	0.1
Murcia	7	0.4	Filipinas	1	0.1
Zaragoza	7	0.4	Menorca	1	0.1
Albacete	6	0.4	Total	1,656	100

Source: prepared by the authors.

3.2. Global Data

The official exposition catalogues were the reference source initially used to analyse the global contribution that areas linked to education made to the various sections. The first study, focused on Product

Classification, was published in 1877 as an organisational and analytical guide (Barcelona Universal Exposition, 1887, 1888a, 1888b, 1888c).

Table 2
Classification of Objects Presented at the 1888 Universal Exhibition

Section	Group	Category	Description
1 (Materials)	1	1-7	Natural organic matter.
		6	Forestry exploitation products.
	2	8-12	Natural inorganic matter.
		8	Mineral production.
2 (Force)	3	13-17	Engines.
	4	18-43	Operating machines-tools.
3 (Labour and subsidiaries)	5	44-101	Useful accessories and work procedures for satisfying physical needs.
		93	Pharmaceutical material and chemical arts procedures applied to pharmacy. C. Books and study/teaching material.
		94	Medical material and procedures in general. G. Drawings, photographs, descriptions and anatomical collections, etc.
		99	Recreational and scientific toys for children and adults. Domestic games and amusements.
		100	Popular amusements, games and exercises.
	6	102-110	Useful accessories and work procedures to meet intellectual needs.
		105	Elementary teaching organisation, material and procedures.
		106	Secondary teaching organisation, material and procedures.
		107	Higher education material and procedures.
		108	Organisation, material and procedures used to teach the blind and deaf-mutes.
		109	Material, method and organisation for free public teaching establishments.
		110	Scientific research material, method and organisation.
	7	111-117	Useful accessories and work procedures to meet affective needs.
4 (Human Needs)	8	118-169	Industrial products to meet physical needs.
		139	Laces, tulle, embroidery and trimmings.
		144	Basketry products.
		145	Manufactured iron products.
	9	170-177	Products of human labour to meet intellectual needs.
		171	Scientific tools and apparatuses.
		172	Printing and bookshop products.
		173	Positive results of teaching.
		174	Scientific research works and practical results.
		175	Complementary general teaching works.
		176	Museums and scientific collections complementary to higher education.
	10	178-187	Products of human labour to meet affective needs.
		178	Lithographs and engravings.
		179	Oil and other paintings.
		184	Literary and musical works.

Source: prepared by the authors.

Table 3

Categories related to education, ordered by frequency and percentage of objects presented at the 1888 Universal Exhibition

Category	Frequency	%	Category	Frequency	%
Organisation, material and procedures used to teach the blind and deaf-mutes	355	24.43	Oil and other paintings	4	0.28
Higher education material and procedures and Positive results of teaching	297	20.44	Mineral production	3	0.21
Positive results of teaching	191	13.15	Laces, tulle, embroidery and trimmings	3	0.21
Secondary teaching organisation, material and procedures and Positive results of teaching	169	11.63	Scientific research material, method and organisation	2	0.14
Secondary teaching organisation, material and procedures	129	8.88	Scientific tools and apparatuses	2	0.14
Elementary teaching organisation, material and procedures	93	6.40	Products of human labour to meet intellectual needs	2	0.14
Without specifying category	61	4.20	Natural inorganic matter (in particular, category 12 H.)	2	0.14
Lithographs and engravings	29	2.00	Engines (in particular, category 15 A.)	2	0.14
Complementary general teaching works	28	1.93	Natural inorganic matter (in particular, category 10)	1	0.07
Manufactured iron products	21	1.45	Medical material and procedures in general. G. Drawings, photographs, descriptions and anatomical collections, etc.	1	0.07
Higher education material and procedures	10	0.69	Scientific research material, method and organisation	1	0.07
Basketry products	10	0.69	Useful accessories and work procedures to meet affective needs (in particular, category 115)	1	0.07
Forestry exploitation products	7	0.48	Industrial products to meet physical needs (in particular, category 120)	1	0.07
Recreational and scientific toys for children and adults. Domestic games and amusements	6	0.41	Scientific research works and practical results	1	0.07
Laces, tulle, embroidery and trimmings	6	0.41	Products of human labour to meet affective needs (in particular, category 180)	1	0.07
Literary and musical works	5	0.34	Products of human labour to meet affective needs (in particular, category 185)	1	0.07
			Total	1,448	

Source: prepared by the authors.

Based on these criteria, we have selected the sections, categories and subjects directly related to education, and all others with some possible form of indirect connection. Among other reasons, this is due to the detailed descriptions of certain parts of the exposition contrasting with others for which we have no other information than the brief notes included in the official catalogues, which are typically sparse and use standardised wording.

Our analysis begins with the categories with the highest number of contributions, reporting the percentage of awards obtained and analysing their essential characteristics to determine the geographical area of the Iberian Peninsula from which they originate. We started with the hypothesis that the individuals and institutions represented were primarily concentrated in the areas of influence of Barcelona and Catalonia due to the physical location of the Exposition. Added to these were contributions from Madrid as the capital of the Kingdom. These two regions, therefore, accounted for the highest volume of contributions, the widest range of categories in which they participated, and the highest percentage of awards and distinctions received. This hypothesis implied that the most significant advances in the field of teaching and scientific research were similarly concentrated in these areas of Spain, with all the implications that this entailed.

3.3. Medals and Diplomas

The Exposition featured a wide range of categories and sections to accommodate the participating companies, entities, institutions and individuals from various social, cultural and economic spheres. Gold, silver and bronze medals were awarded as prizes, based on different criteria and justified reasons, alongside diplomas and commendations that, at the time, were formalised as official documents. Furthermore, to document and publicise the results of the awards, the organisers of the 1888 Barcelona Exhibition published the various award categories to ensure legal certainty and prevent fraud.

In the first phase of the research, based on official sources, we found that the total number of awards and honourable mentions related to teaching, education, and training was 464, meaning that 28% of the total contributions had been recognised for their particular merit. Of these, 308 were awarded to educational institutions and entities, while 156 were given to individuals who took part in the exhibition.

Table 4
Awards given to Spanish participants at the 1888 Universal Exhibition
in categories related to educational heritage

Category	Gold Medal	Silver Medal	Bronze Medal	Honourable Mention	Diploma
Forestry exploitation products		2	1		
Natural organic matter			1		
Mineral production		1			
Useful accessories and work procedures for satisfying physical needs (in particular, category 75)			1		
Recreational and scientific toys for children and adults. Domestic games and amusements.	1		2		
Popular amusements, games and exercises	2	2	1	1	
Elementary teaching organisation, material and procedures	1	12	25	38	
Secondary teaching organisation, material and procedures	6	20	35	21	1

Category	Gold Medal	Silver Medal	Bronze Medal	Honourable Mention	Diploma
Higher education material and procedures	9	8	10	4	2
Organisation, material and procedures used to teach the blind and deaf-mutes	5	1	1	2	
Material, method and organisation for free public teaching establishments				1	
Scientific research material, method and organisation		2			
Industrial products to meet physical needs (in particular, category 130)		1	1		
Industrial products to meet physical needs (in particular, sub-category 137)				1	
Laces, tulle, embroidery and trimmings		1			
Basketry products			1		
Manufactured iron products		1	3	2	
Industrial products to meet physical needs (in particular, category 151)	22	24	21	26	2
Industrial products to meet physical needs (in particular, category 152)					1
Scientific tools and apparatuses		1			
Positive results of teaching	20	56	54	50	1
Scientific research works and practical results	1	2			1
Complementary general teaching works	7	8	16	6	
Lithographs and engraving		3	4	2	
Oil and other paintings		1			
Products of human labour to meet affective needs (in particular, category 182)	1	1			
Products of human labour to meet affective needs (in particular, category 186)				1	
Products of human labour to meet affective needs (in particular, category 187)	1				
Elementary teaching organisation, material and procedures and Positive results of teaching		1	2		
Secondary teaching organisation, material and procedures and Positive results of teaching	10	16	16	28	
Higher education material and procedures and Positive results of teaching	5	10	13	6	
Higher education material and procedures and Lithographs and engravings					1
Total	91	174	207	189	9
Total Medals			472		
Total Medals and Honourable Mentions				661	
Total					670

Source: prepared by the authors.

3.4. Teaching Results

After progressing the research by determining the contributions related to teaching distributed by the geographical area, section, group and category in which they were presented, and the distribution of the various awards and honourable mentions, we decided to verify the reliability of and validate the statistical data before continuing. We began by analysing the categories with the highest number of contributions, selecting from them the specialisation area in which we have developed a significant part of our research, to focus the process on the validation of the data based on the materials presented by the Universities.

We started with Category 173, which grouped “Positive results of teaching in general”, and included among its eight sub-categories “Studies, projects, works, and academic tasks of students in higher education”. Categories 173 and 107, “Positive results of higher education”, jointly totalled 20.44%, with Category 107, “Materials and procedures of higher education”, representing 0.69%. Without computing section C of 173, the data indicated that at least 21.13% of the contributions came from universities. We decided to apply the awards obtained by each category in the sample as a selection criterion to begin our analysis. We knew that 20 gold medals, 19 silver medals, 39 bronze medals and 34 honourable mentions were awarded in Category 173. Category 173/107 included 5 gold medals, 10 silver, 13 bronze and 6 honourable mentions, while Category 107, despite representing only 0.69% of the total, received 9 gold medals, 8 silver, 10 bronze, 4 honourable mentions and 2 diplomas.

Although the selected sample was representative, the analysis involved a minimum of 179 contributions. We, therefore, opted to apply a second selection criterion based on materials awarded gold medals, which limited the sample to 34. As we began the study of the gold medals obtained by universities, the complexity involved in validating the statistical data obtained in the first phase became apparent. Determining anything else about the participation of many institutions beyond the categories and data in the catalogues is complex, as contributions are associated with individuals participating in the Exposition. The various official Exposition catalogues only recorded the participation of five Spanish universities: Santiago (2 contributions)¹, Salamanca (3), Barcelona (18), Oviedo (12) and Granada (94). When we attempted to determine the scope of these contributions as a preliminary step, in contrast to the research on the awards obtained in the categories grouping elements of university teaching, the data detailed below were verified.

3.4.1. Universities

The University of Salamanca submitted only a small set of annual reports from the University and its district (3 contributions). The University of Santiago de Compostela took part with a comprehensive and systematically classified collection of minerals from Galicia (2). The University of Granada presented nearly one hundred contributions (94), characterised by a large number of works related to the humanities and law (18). Noteworthy were unique contributions in the field of botany (Amo) and practical medicine, including at least nine anatomical models demonstrating methods used in higher education. These were accompanied by a *Descripción del astrolabio* (*Description of the Astrolabe*) by Almagro, *Modelos de circulación fetal* (*Models of Fetal Circulation*) and *Preparaciones microscópicas* (*Microscopic Preparations*) by Solá. Contributions in mathematics, physical sciences, and natural sciences were minimal beyond those already mentioned.

Among the works awarded a gold medal were: *Glosario etimológico de las palabras españolas* (*Etymological Glossary of Spanish Words*) by Eguilaz; *Literatura clásica* (*Classical Literature*) by González Garbín; *Atlas de*

¹ In brackets, the number of contributions recorded in the official awards catalogue.

Geografía (Atlas of Geography) by Antero; and *Bibliografía española del Derecho (Spanish Bibliography of Law)* by Torres Campos. Silver medals were awarded to the *Memorias acerca del estado de la Universidad y de los Establecimientos de enseñanza del distrito en los cursos académicos 1876 a 77, 77 a 78, 78 a 79, 79 a 80, 80 a 81 y 81 a 82 (Reports on the State of the University and the Educational Establishments of the District for the Academic Years 1876-77 to 1881-82, 6 volumes)*; *Estudios literarios filosóficos e históricos (Literary, Philosophical and Historical Studies)* by Villarreal; *Derecho eclesiástico (Ecclesiastical Law)* by Manjón; *Gramática elemental de la lengua latina (Elementary Grammar of the Latin Language)* by Gurría; *Las siete Tragedias de Esquilo (The Seven Tragedies of Aeschylus)* by Brieba; *Historia de la metafísica (History of Metaphysics)* by Lledó; *Derecho romano (Roman Law)* by Rada; *El Faro de la juventud (The Beacon of Youth)* by Vico Bravo; and *Tratado de Aritmética y de Álgebra (Treatise on Arithmetic and Algebra)* by Rochano. A diploma was granted to a broad *colección de obras científicas, escritas por diferentes autores (collection of scientific works written by various authors)*.

The University of Oviedo submitted twelve contributions, almost half of which were related to law and political science. Silver medals were awarded to *El Parlamentarismo (Parliamentarism)* and *Principios de Derecho político (Principles of Political Law)* by Adolfo Posada. In the field of economics, notable works included *La nueva ciencia penal (The New Penal Science)* by Félix de Aramburu, *Los Foros (The 'Foros')* by Rogelio José Bravo, and *Programas de Economía Política (Political Economy Programmes)* by Buylla, Alas and López Estrada. A second silver medal was awarded for *Historia de la Universidad (History of the University)* by Fermín Canella. Photographs and architectural plans of the university building were also submitted as a symbol of prestige, aligning with the value placed on educational infrastructure promoted by universal expositions. Other contributions included various *Memorias* (1876-77 and 1885-86), *Discursos inaugurales (Inaugural speeches)* (1878-1888) and a model of educational furniture, a desk and a bench. This furniture adhered to the guidelines of the *Museo Pedagógico Nacional (National Pedagogical Museum)*, prioritising ergonomics and enabling a new classroom layout.

As an institution, the University of Barcelona was represented mainly through works and monographs authored by its faculty. However, due to the generic nature of the catalogues, it is impossible to determine the titles, authors or fields of these contributions. Also submitted were various teaching programmes and questionnaires, speeches and textbooks, all listed in official documents with the same imprecise classification. Reference is made to two types of escanógrafo (scanograph), described only as 'teaching materials', and to a work entitled *El libro de las niñas (The Girls' Book)*, with no identified author. Among these materials, a silver medal was awarded to the speech delivered at the *Congreso Nacional Pedagógico de Barcelona (Barcelona National Pedagogical Congress)* on *Educación artística de la mujer (Artistic Education for Women)*, and a diploma was awarded for a collection of *memorias inaugurales y datos estadísticos (1845-1888) (inaugural lectures and statistical data, 1845-1888)*. However, as later confirmed, it was the individual contributions of faculty members, presented on their own behalf, that received the greatest recognition and, indirectly, represented the various universities to which they belonged and where they carried out their academic work.

3.4.2. University Professors

As an exploratory approach, we analysed the gold medals awarded during the exhibition as a preliminary indication of the state of higher education in Spain. As posited in our hypothesis, apart from the categories established in the catalogues, nearly all the medals awarded to individuals were confirmed to have been given to professors from the University of Barcelona, with the sole exception of one awarded to a faculty member from the School of Pharmacy at the University of Granada. Of these, more than half were in the

Barcelona Faculty of Medicine. Three were awarded for research work, two for technical innovations and the rest for publications, theoretical works and academic projects.

Paradoxically, the catalogue lists the future Spanish Nobel laureate as: 's/n. Cajal, Santiago. Barcelona. Preparaciones Micrográficas. O" (p. 30). Given the significance of Santiago Ramón y Cajal for the history of science and education, and in light of the recognition given to professors from the University of Barcelona, we focused our research on this specific context.

3.5. Medicine

As previously noted, at least eight staff members at the Faculty of Medicine of the University of Barcelona were awarded gold medals. Three received the award for their research, most notably Santiago Ramón y Cajal (1852-1934), Professor of Histology, for his *preparaciones micrográficas* (*micrographic preparations*). He was joined by Joaquín Bonet (1852-1913), Professor of Obstetrics, rewarded for his *trabajos plásticos y roturados sobre obstetricia* (*labelled obstetrics models*), and Laureano Coll y Soler, for his *preparaciones plásticas* (*models*).

Two additional gold medals were awarded for technical innovations. Antonio Morales Pérez (1848-1930), Professor of Surgery, was recognised for several *aparatos de su invención* (*devices of his invention*) related to *termo-eterización* (*thermo-etherisation*) as a method of surgical anaesthesia.

The remaining awards, including some to the previously mentioned individuals, were given in recognition of their publications. Two professors of Physiology received awards: Juan Magaz y Jaime received his for his *Tratado de Fisiología humana* (*Treatise on Human Physiology*), while Ramón Coll y Pujol was recognised both for his *Programa de fisiología humana* (1882) (*Human Physiology Programme*) and for *Un enemigo invisible. Estudios familiares relativos a la trichina y la trichinosis* (1883) (*An Invisible Enemy: Family Studies on Trichina and Trichinosis*). Bartolomé Robert y Yarzábal (1842-1902), Professor of Medical Pathology, received an award for his *tratados de Medicina* (*treatises on medicine*). In addition to his prize for the *termo-eterización* procedure, Antonio Morales Pérez received a second gold medal for various works, especially his *Tratado de operatoria quirúrgica* (*Treatise on Surgical Techniques*), published in two volumes (1881), which was used as a textbook by several generations of students.

The Faculty of Medicine was located in the Hospital de la Santa Cruz, where Ramón y Cajal conducted research with limited materials. Despite this, his work led to significant advances in knowledge, making 1888 what he later described as his 'pinnacle' and 'year of fortune'. During this period, he discovered the foundations of neuron theory through a key finding using the *cromo-argentíco* (*silver chromate*) staining method and a double-staining procedure, which revealed the individuality of nerve cells. This gives exceptional value to the histological preparations that he presented at the Universal Exhibition, for which he received a gold medal.

Antonio Morales Pérez was awarded for his *Tratado de operatoria quirúrgica en dos tomos* (*Treatise on Surgical Techniques in Two Volumes*), which became a widely used textbook. He was also recognised for several 'aparatos de su invención' (*instruments of his own design*) related to thermo-etherisation as a surgical anaesthesia method. He had been applying this proprietary procedure to induce patient narcosis since 1888. His research on anaesthetics continued, and its innovations were incorporated into his surgical practice and teaching.

Joaquín Bonet received recognition for his *preparaciones plásticas* (*models*). A senator and writer, he devoted much of his work to combating puerperal infection, a central theme of his talks given to the Royal

Academy of Medicine of Barcelona (1885 and 1896). His colleague at the Faculty, Joan de Rull i Xuriach (1828-1891), Professor of Obstetrics, was awarded a medal for a medical instrument of his invention called the *Traqueotomos (Tracheotome)*. Apart from having served as secretary, dean, and vice-rector of the University, he presided over the Congress of Medical Sciences (1888).

Juan Magaz y Jaime (1823-1901), Professor of Physics and Medical Chemistry at the University of Barcelona since 1851, had previously modified an apparatus to detect arsenic (1855). Following the removal of his subject area from the curriculum, he became Professor of Physiology and authored a *Tratado Elemental (Elementary Treatise, 1869)*, which earned him the gold medal at the 1888 Exposition.

Also honoured was Bartolomé Robert y Yarzábal, Professor of Medical Pathology (appointed in 1875) at the University of Barcelona, who received a gold medal for his *tratados de Medicina (medical treatises)*. He presided over the Academy and Laboratory of Medical Sciences and was involved in relocating the Faculty of Medicine and the Hospital de Sant Pau. He contributed numerous articles to *La Vanguardia*, among which one devoted to university autonomy stands out.

The above demonstrates that, from the 1870s on, the Faculty of Medicine in Barcelona underwent a transformation led by a generation of young lecturers and researchers known as the 'generación médica catalana del 88' (*Catalan Medical Generation of '88*), so named due to their prominence during the Universal Exposition. Their innovations and outcomes in therapeutics and research were partly due to their connections with Europe through publications and their eagerness to improve their knowledge through visits to centres in France and Germany.

They also launched journals such as the *Gaceta Médica Catalana (Catalan Medical Gazette)*, founded in 1881 by Joaquín Bonet, who also organised the International Congress of Medical Sciences, incorporated into the Universal Exposition. As president of the Medical Academy, Bartolomé Robert led the institutional efforts that culminated in the construction of the new Faculty of Medicine and Hospital Clinic, inaugurated in 1906 under the rectorship of Joaquín Bonet. In the same year, the Swedish Academy awarded the Nobel Prize to Santiago Ramón y Cajal, who was appointed president of the newly created *Junta para la Ampliación de Estudios (Board for the Advancement of Studies)* the following year.

3.6. Pharmacy, Sciences and Philosophy and Letters

Alongside Medicine, gold medals were also awarded to professors identified by their affiliation with subjects in the Faculties of Pharmacy. One of these was Fructuoso Plans y Pujol (1832-1890), Professor of Mineralogy and Zoology Applied to Pharmacy at the University of Barcelona, who received an award for his work *Lecciones de farmaco-zoología (Lessons in Pharmaco-Zoology)* (1870). Another recipient was Julián Casaña y Leonardo, Professor of Organic Chemistry at the University of Barcelona, a full member of both the Royal Academy of Sciences and Arts and the city's Royal Academy of Medicine. Having participated in the Catalan Exhibition of 1877, he presided over both the Pharmaceutical and the Pedagogical Congresses held as part of the 1888 Universal Exposition. As Rector of the University of Barcelona, he was recognised for his *Treatise on Organic Chemistry Applied to Pharmacy and on Chemical-Organic Pharmacology* (1877), along with his proposal entitled *Notes for the Reform of Teaching at the Faculty of Pharmacy* (1865). Also included was Mariano del Amo y Mora (1809-1894), Professor of Botany and Dean (1853) of the Faculty of Pharmacy at the University of Granada, who founded the faculty's herbarium and was director of the Botanical Garden. He received an award for his work *Flora fanerogámica de la Península Ibérica (Phanerogamic flora of the Iberian Peninsula)* (6 vols., 1871-1873).

To these names can be added Lauro Clariana y Ricart (1842-1916), Professor of Differential and Integral Calculus at the University of Barcelona (1881-1916), awarded for his *Exercises and Problems in Plane Geometry* (1876). The subtitle on the cover of the work indicated it was 'Of great utility for Secondary Education and Preparatory Schools', and further detailed that the exercises were 'Collected and duly developed by Mr. Lauro Clariana y Ricart, Engineer and Mathematics Teacher at the Provincial Institute of Tarragona', a position that he held from 1870 to 1881. The book was accompanied by an atlas containing over two hundred figures. His other recognised works included an *Elementary Treatise on Calculus* (1886) and an *Elementary Treatise on Pure Kinematics* (1879).

In addition, Ramón Manuel Garriga Nogués (1835-1906), Professor of Hebrew (1867), philologist and Hellenist, who later served as Rector of the University of Barcelona (1900-1901), was awarded for various works, including *Elements of Hebrew Grammar* (1866) and the *Practical Manual of the Hebrew Language* (1867), primarily aimed at students in seminaries and theology faculties. Cayetano Vidal y Valenciano (1834-1893), professor at the Faculty of Philosophy and Letters at the University of Barcelona, also presented several works, including the novel *La vida en lo camp* (*Life in the Countryside*), which received an award, and a *Historical Overview of the University of Barcelona* (1881).

4. CONCLUSIONS

The object of study of this research has evolved beyond quantitative counting and statistical analysis in line with the progress made in the investigation itself. It can be stated that validating the results required contrasting contributions made by institutions with individual contributions to assess the true impact that education had at its various levels and forms in the framework of the Universal Exposition.

As part of the findings, this study documents the institutional participation of Spanish universities and of affiliated professors who participated independently, with the goal of better understanding the real impact of higher university education. As such, the results cast doubt on the reliability of the statistical data initially used, while also helping to calibrate their significance.

The relevance of one area of Spanish medical science, represented by Santiago Ramón y Cajal, is a determining factor in the importance given to scientific research. Similarly, the value of the award-winning academic work of Ramón y Cajal's colleagues at the renewed Faculty of Medicine at the University of Barcelona highlights the impact of teaching. Additionally, the presence of recognised scholars in fields such as Organic Chemistry, Mineralogy, and Botany, all linked to the Faculty of Pharmacy, and the pedagogical reach of mathematical science represent a counterpoint to the so-called 'Spanish science controversy'; a debate that resurfaced in the final third of the 19th century around the figure of Marcelino Menéndez Pelayo and his work *La ciencia española* (*Spanish Science*), the definitive version of which was published in 1887.

However, if we include awards given to works submitted by Philology and Philosophy and Letters teachers, we see that most were awarded for works with a practical value. This supports the claim of a fertile intellectual reality in the construction of knowledge and academic output, contrary to accusations of intellectual sterility. Even so, no definitive arguments exist to resolve the broader controversy as to whether Spanish universities were truly capable of producing modern and competitive knowledge at the cutting edge.

It remains a fact that only four Spanish universities were officially represented. Moreover, it was professors at the University of Barcelona who garnered nearly all the top awards. This is consistent with the number of institutions and individuals linked to Barcelona's (and Catalonia's) educational system that participated in the Exposition, although this needs to be corroborated in detail.

Faced with an intellectual tradition in Spain that had historically been regarded as sterile, in his 1897 lecture *The State's Duties in Relation to Scientific Production*, delivered just before the turn-of-the-century crisis, Santiago Ramón y Cajal called on the government to shoulder the 'inescapable obligation' to promote and stimulate culture through 'a scientific policy aimed at generalising instruction and benefitting the common good by nurturing all useful and fertile talents emerging from the heart of the nation' (Ramón, 1971, p. 154).

Study findings help us assess the effort to highlight the state of Spanish education during the period, while also emphasising the value of Universal Expositions as significant sources for ongoing investigation into educational heritage, its typologies and manifestations. Similarly, these events provide a valuable lens through which to understand the work of professors and researchers.

A thorough evaluation and analysis of the educational and heritage materials presented, beyond a mere quantification of the facts, is essential. This research is ongoing and will offer a comprehensive overview that represents a major opportunity to analyse educational methods and resources used throughout Spain.

Nonetheless, Universal Expositions can be affirmed to have become cultural and technological events that contributed to the development and modernisation of education systems. Consequently, they became an important factor in consolidating policies that linked education to the ideals of progress, industrialisation and citizenship, hallmarks of Western societies during the transition from the 19th to the 20th century.

5. FUNDING

This article is part of the project *La historia pública de la Educación en Andalucía (1990-2020): Mostrando recursos y experiencias*, funded by the University of Malaga's Second Internal Plan and ERDF funds.

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