THE PRESENCE OF UNIVERSAL ACCESSIBILITY IN DOCTORAL DISSERTATIONS DEPOSITED IN SPAIN BETWEEN 1998-1999 AND 2017-2018 ACADEMIC YEARS

Lourdes González-Perea, Jesús Hernández-Galán,
Natalí González Villariny

[1,2,3]ONCE Foundation, C/ Sebastián Herrera, 15, 28012 Madrid. Spain.
[1]lgperea@fundaciononce.es, [2]jhernandez@fundaciononce.es,
[3]ngonzalez@fundaciononce.es

Abstract: The goal of this research is the identification and analysis of doctoral dissertations registered in Spain that address universal accessibility as a topic in order to detect trends, the scope for development and leading institutions. The TESEO database has been used as a basic tool. A significant number of dissertations on universal accessibility published in Spain between 1998-1999 and 2017-2018 academic years have been identified, although these make up a small proportion of the total number of those registered. Specifically, the database contains 108 dissertations on this subject. The most common topics are the accessibility to digital services in general, accessibility to art, culture and tourism, inclusive education, assistive products, accessibility to the urban environment, transport and buildings, and accessibility as a fundamental right. Some of the dissertations found a deal with subjects rarely studied from the point of view of universal accessibility, such as banking, communication, employment, the home and R&D&I processes. The educational institutions which have published the largest number of these dissertations on universal accessibility are the Technical University of Madrid and the University of Granada, followed by the University of Valencia and the Technical University of Valencia.

Introduction

The aim of documentation as a discipline is "the study of an informational process which is peculiar in that it involves the retrieval of informational messages issued in previous processes" (López, 2011).

The identification, analysis and processing of information on a particular field of study can be used by people and organisations to support their decision making regarding matters they consider of interest.

Doctoral Dissertations are one of the most relevant documentary sources for studying the state of research in a country through its scientific literature (Oliva, 2014). Therefore, they should be taken into account in scientific documentation processes.

In addition, thanks to technological advances, doctoral dissertations are no longer restricted by their condition as "grey literature" and can now be found in digital repositories, facilitating their consultation (Jiménez, Ruiz and Delgado, 2014).

Investigating doctoral dissertations on a specific topic, in a specific period, in a specific country or even in a specific educational institution, is relevant both to know the state of research therein and to identify the interest that it generates among researchers who are considering writing a dissertation (Sanchidrián, 2016).

TESEO is the database in which the doctoral dissertations defended in Spain since 1976 are registered. It is managed by Spain's Ministry of Education, Culture and Sport.

There has been a significant increase in the number of dissertations registered in Spain, so TESEO can be considered a reliable reference for consulting the

subjects of greatest interest to researchers. An indicator that reflects this increase is the number of doctoral dissertation registered in this database per year according to the Ministry of Education, Culture and Sport: in 2008 the database contained information on 7,830 dissertations, while in 2017, ten years later, the number of registered dissertations was 17,286.

However, according to Fuentes and Arguimbau (2010), not all dissertations written in Spain are registered in TESEO, since the figures are somewhat lower than those provided by the National Statistics Institute (INE in its Spanish initials) whose data comes directly from an administrative query to all Spanish universities. If the data from TESEO and INE are compared for the period between the 1997-1998 and 2007-2008 academic years, we can see that the dissertations stored in TESEO represent 87.3% of those quantified by INE, so there is a small gap.

Even with these limitations detected in TESEO, the information that this database provides on registered dissertations allows to identify the topics addressed in order to detect areas of interest for researchers. Specifically, some of the data stored in TESEO includes:

- Dissertation Title.
- Author.
- University.
- Department.
- Doctoral programme.
- Reading date.
- Dissertation Advisor.
- Jury.
- UNESCO descriptors.
- Dissertation Abstract.

Several studies exist which analyse the state of play of specific subjects through consultation of TESEO: for example, the history of communication (Sanchidrián, 2016), graphic design (Oliva, 2014) or psychiatry (Moyano, Delgado and Buela, 2006). However, no study has been detected which analyses the presence of universal accessibility in doctoral dissertations registered in Spain.

In this context, accessibility is "the extent to which products, systems, services, environments and facilities are able to be used by a population with the widest range of characteristics and capabilities (such as physical, cognitive, financial, social and cultural), to achieve a specified goal in a specified context" (Persson, Åhman, Yngling and Gulliksen, 2015).

Spain is notable for having extensive legislation on universal accessibility. Most legal references on this subject are included in Royal Legislative Decree 1/2013, of 29 November approving the "Consolidated Text of the General Law on the rights of persons with disabilities and their social inclusion". However, several studies show important deficiencies on this matter in different areas: municipalities in Spain (ONCE Foundation, 2011), intercity transport (ONCE Foundation, 2012), housing (ONCE Foundation, 2013), the workplace (ONCE Foundation, 2015) and tourism (ONCE Foundation, 2016), among others.

According to the aforementioned studies, the lack of accessibility is partly because currently available solutions have not been applied, but also due to the lack of awareness and technical knowledge acquired by today's professionals in their university education such as architects, engineers, teachers or journalists.

Regardless of the real state of accessibility in different environments (such as urban, educational, employment or domestic), new processes, products and services are being integrated into society which has not yet been endowed with universal accessibility solutions. Therefore, it would be interesting to know if educational institutions in general and Spanish researchers in particular,

consider universal accessibility as a discipline worthy of focusing their research on.

Methodology

The goal of this research is the identification and analysis of doctoral dissertations registered in Spain that address universal accessibility as a topic in order to detect trends, scope for development and leading institutions.

The TESEO database has been used, applying several search strategies, to find the dissertations on universal accessibility.

Identification of doctoral dissertations

The first step was to decide which academic years should be used for the research. To analyse the production of dissertations over the last twenty years, the 1998-1999 academic year was used as a starting point and 2017-2018 as the ending point.

The next step was to establish the search strategies that would be used. Specifically, the following keywords and expressions were entered in the "title" field of TESEO: accessibility, accessible, universal design, design for all people, assistive product, assistive technology, functional disability and diversity.

At the same time, a query was performed using the UNESCO codes for the classification of doctoral dissertations by keywords. The code "6310.05 Handicapped" was used. This term, despite not being politically correct, is the closest keyword in relation to the subject of this research.

To avoid duplication of results, the combined query was carried out on the UNESCO code and on dissertations that do not include the word "disability" in the title.

Finally, a search was carried out in TESEO of Spanish authors who have published works on the subject of universal accessibility and whose doctoral dissertations do not appear in the previously carried out queries.

Analysis of records

After applying the search strategy described above, the files pulled up by TESEO on each doctoral dissertation were analysed.

The following actions were carried out during this analysis:

- Review of the abstracts of the resulting files to determine if the dissertation is related to universal accessibility.
- Grouping of the dissertations into fields of application (such as education, employment or urban environment).
- Determination of whether the dissertation addresses accessibility in a transversal way or if it focuses solely on the ICT environment or the built environment.
- Quantification of dissertations by educational institution.

Presentation of results

This section describes the results obtained after applying the described methodology.

Number of dissertations related to universal accessibility

After carrying out the search in TESEO using the words and expressions described in the methodology, 617 records have been identified. However, most of them are matches and the rest, despite including terms related to the field of study, do not actually focus on the topic of universal accessibility.

For example, some dissertations contain in their title the words "accessibility" and "disability", so they appear when applying both search strategies. Others include the word "disability", but focus on aspects related to the categorisation of groups: they do not cover any aspect related to the design of accessible environments, products and services. Finally, some dissertations contain the word "accessibility" but actually deal with issues related to geography, medicine, biology, and others, without focusing on any aspect of universal design.

The following table shows the number of dissertations that appear after applying the different search strategies, as well as the number found to be related to universal accessibility.

The strategies appear in the same order in which they were employed in TESEO. This means that if a dissertation that appears in several searches has been found, for example, because the word "accessibility" appears in the title, it is not subsequently counted again when it appears because of the word "disability", otherwise, the number of doctoral dissertations related to the subject of study would appear higher than it actually is.

Table 1: Doctoral dissertations related to universal accessibility

Search strategy	Records obtained	Related to Universal Accessibility
"accessibility" in title	92	51
"accessible" in title	23	17
"universal design" in title	2	2
"design for all people" in title	0	0

Search strategy	Records obtained	Related to Universal Accessibility
"assistive products" in title	2	2
"assistive technologies" in title	2	2
"disability" in title	422	23
UNESCO Code and absence of "disability" in title	39	3
"functional diversity" in title	25	6
Search for authors whose dissertations do not appear previously	10	2
Total	617	108

The table shows that of the 617 records identified after applying the different search strategies, it is estimated that 108 doctoral dissertations registered in Spain between the 1998-1999 and 2017-2018 academic years address specific topics related to universal accessibility (17.5%).

Results detected by entering terminology on accessibility

The number of dissertations that contain words and expressions related to universal accessibility in the title and that actually address this topic is quite high: 51 of the 92 dissertations that include the word "accessibility" in title address this topic (55.4%), 17 of the 23 that contain the word "accessible" also do so (79.9%), as do the two dissertations identified as a result of searching using the expression "universal design" (100%).

Searching for dissertations using the expression "design for all people" produces no results. This may be due to the fact that it is not until relatively recently that the use of gender-neutral language has been promoted. In addition, this expression may be considered by researchers as too broad to be included in a dissertation title.

Assistive technologies and products as tools to overcome physical, technological and communication barriers have become important elements in relation to universal accessibility. The expression "assistive products" returns two dissertations related to the subject of study in TESEO. Likewise, entering "assistive technologies", returns two more dissertations. No records are found when either expression is entered in the singular.

Results detected by entering terminology on disability

When entering terms related to people with disabilities in the title, TESEO returns a significant number of results, although the number of these that actually focus on universal accessibility is lower or, in many cases, these dissertations have already been found in searches using other terms.

For example, of the 422 results found after entering the word "disability" in the title, only 23 of these dissertations address some aspect related to universal accessibility (5.4%).

In addition, searching for dissertations using the UNESCO classification code 6310.05, "Disability", excluding the word "disability" in the title to avoid duplicating results, produces 39 records, of which only three are related to the subject of study (7.7%).

Universal accessibility does not just benefit people with disabilities, so there may be relevant dissertations which have a broader focus. For this reason, the dissertations that contain the expression "functional diversity" in the title have been included. After conducting the search in TESEO, 25 records have been

detected, of which six are related to universal accessibility and human diversity (24%).

Search for renowned experts

After identifying all the dissertations related to universal accessibility the next step was to check the authorship of these in order to detect if there are any renowned experts in this field whose dissertations have not previously been located. Specifically, the details of ten authors have been introduced.

The previous steps have generally identified all the authors who are renowned in Spain for disseminating scientific knowledge on universal accessibility and who have a doctorate. However, it has been considered relevant to add two authors whose dissertations have not been found with the search strategies previously applied and who address in their works some aspect related to universal accessibility.

Dissertations read per year

Of the 108 doctoral dissertations identified in TESEO that address some aspect related to universal accessibility, 57 of them have been read between 2015 to 2018 (52.7%).

Fifteen dissertations were read in 2015 and twenty were read in 2016 and 2017 respectively. In 2018, only two have been identified as having been read, although this figure is expected to increase once all the dissertations read during the 2018-2019 academic year have been registered in TESEO, since this study has been carried out before the end of 2018.

Prior to 2015, the years 2010 and 2014 stand out in terms of the number of dissertations read with respect to other years: nine and eight were read respectively.

No dissertations addressing universal accessibility were found on TESEO database between 1998 and 2000.

The following table shows the number of dissertations read in each year.

Table 2: Dissertations read per year

Year	Dissertations read on accessibility
2018	2
2017	20
2016	20
2015	15
2014	8
2013	4
2012	3
2011	2
2010	9
2009	6
2008	6
2007	2

Year	Dissertations read on accessibility
2006	1
2005	3
2004	4
2003	1
2002	1
2001	1
1998-2000	0
Total:	108

Dissertation topics

Of the 108 dissertations which address universal accessibility, a significant number deal with aspects related to digital accessibility, in other words, accessibility to ICT-based products and services (52.8%). Also noteworthy is the number of dissertations that seem to address the topic of accessibility transversely (43.5%).

Regarding the subjects of the dissertations, a significant number, 21, address aspects related to accessibility to digital services without focusing on a specific field of application. The most studied technologies are the internet and mobile applications.

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The next most studied subject is the accessibility to art, culture and tourism, with 17 dissertations focusing on this category. These deal with general aspects related to tourism, but also cover specific aspects of accessibility to buildings such as museums, theatres or hotels.

Accessibility to education is also an intensely studied subject, dealt with by 13 dissertations. In general, accessibility is approached from a transversal perspective, although five dissertations focus solely on ICT aspects. This is due to the growth of e-learning as a learning modality.

Twelve dissertations on assistive products for different user profiles have been found. A significant number of dissertations in this category focus specifically on ICT assistive products (66%).

Eight dissertations exist on urban environment and transport accessibility. These have been grouped because of the aspects they have in common.

Several dissertations in this category cover aspects of accessibility related to the natural environment, parks and gardens (three dissertations).

Although related to the urban environment, a separate category has been created to group the dissertations that deal with accessibility in buildings. Of the seven dissertations on this subject, as with education, a large proportion deal with ICT-related aspects. In this case, three of the dissertations address aspects related to indoor guidance.

Six dissertations fall into the law category in which accessibility is dealt with as a fundamental right.

Five dissertations have been identified that focus on accessibility to public administration services. Of these, again a large proportion deal with ICT (80%), in this case, electronic administration services.

In the health category, also containing five dissertations, a great deal of the research is also based on ICT issues (60%): telemedicine, telecare and nursing websites.

A smaller number of dissertations have been identified that research issues related to communication, the home, R&D, leisure, banking and employment.

Of these, it is worth highlighting the R&D category which contains dissertations which focus on the integration of people with disabilities in research and development processes.

The following table shows the subjects of the 108 identified dissertations, sorted by the number of dissertations per scope of the study. Also, the table indicates how many approach accessibility in a transversal way and how many focus on a field of application: ICT environment or built environment.

Table 3: Predominant topics

Predominant Subjects	Total Dissertations	Transversal Accessibility	ICT Environment	Built Environment
General ICT services	21	0	21	0
Art, culture and tourism	17	13	4	0
Education	13	7	5	1
Assistive products	12	4	8	0
Urban environment and transport	8	7	0	1

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Predominant Subjects	Total Dissertations	Transversal Accessibility	ICT Environment	Built Environment
Buildings	7	4	3	0
Law	6	5	1	0
Public administration	5	0	4	1
Health	5	2	3	0
Communication	3	2	1	0
Home	3	0	2	1
Leisure	3	0	3	0
R&D	3	2	1	0
Banking	1	0	1	0
Employment	1	1	0	0
Total:	108	47	57	4

Universities of origin

The educational institutions which have published the most significant number of these dissertations on universal accessibility are the Technical University of Madrid and the University of Granada, with eight and seven dissertations respectively. These are followed by the University of Valencia and the Technical University, each with six dissertations.

The following table shows the number of dissertations on universal accessibility that have been published by the universities that have addressed this topic.

Table 4: University of origin of the dissertation

University	No. Dissertations
Autonomous University of Barcelona	4
Autonomous University of Madrid	2
Charles III University of Madrid	4
Complutense University of Madrid	4
University of A Coruña	3
University of Alcalá	4
University of Alicante	4
University of Barcelona	2
University of Burgos	1
University of Cadiz	1
University of Cordoba	4
University of Deusto	2

University	No. Dissertations
University of Extremadura	5
University of Granada	7
University of Huelva	2
University of Jaen	3
University of the Balearic Islands	2
University of Leon	2
University of Lleida	2
University of Malaga	5
University of Murcia	3
University of Oviedo	1
University of Salamanca	2
University of Seville	3
University of Vigo	3
University of Zaragoza	1

University	No. Dissertations
University of the Basque Country/ Euskal Herriko Unibertsitatea	1
Jaume I University of Castellón	2
Miguel Hernández University of Elche	1
National University of Distance Education	2
Technical University of Madrid	8
Pontifical University of Salamanca	2
Public University of Navarre	1
Ramón Llull University	1
King Juan Carlos University	2
University of Valencia	6
Technical University of Valencia	6

Conclusions

Having identified all the dissertations registered in Spain that address universal accessibility, the following conclusions can be drawn:

- Of the 617 records identified after applying the different search strategies, it is estimated that 108 doctoral dissertations registered in Spain between 1998-1999 and 2017-2018 academic years address specific topics related to universal accessibility (17.5%).

- The number of dissertations that contain words and expressions related to universal accessibility in the title and which actually address this topic is quite high: 51 of the 92 dissertations that include the word "accessibility" in title address this topic (55.4%), 17 of the 23 that contain the word "accessible" also do so (79.9%), as do the two dissertations identified as result of searching using the expression "universal design" (100%).

- When entering the word "disability" in the title, TESEO returns an important number of results (422), although a large number of the dissertations related to universal accessibility appeared after searching using terminology related to this concept. Only 23 more dissertations are found that address some aspect related to universal accessibility (5.4% of the 422 dissertations).

- Searching for dissertations using the UNESCO classification code 6310.05, "Disability", excluding the word "disability" in the title to avoid duplicating results, produces 39 records, of which only three are related to the subject of this study (7.7%), since a large number of the dissertations had already been previously found in the previous searches.

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- If the concept of "functional diversity" is applied to the title in the search, 25 records are detected, of which six are related to universal accessibility and human diversity (24%).

- Of the 108 doctoral dissertations identified in TESEO that address some aspect related to universal accessibility, 57 of them have been read between 2015 to 2018 (52.7%). Prior to 2015, the years 2010 and 2014 stand out in terms of the number of dissertations read with respect to other years: 9 and 8 were read respectively.

- In relation to the total number of dissertations selected which address universal accessibility, a significant number deal with aspects related to ICT (52.8%). Also noteworthy is the number of dissertations that seem to deal with accessibility from a transversal perspective (43.5%).

- The most common topics are accessibility to digital services in general, accessibility to art, culture and tourism, inclusive education, assistive products, accessibility to the urban environment, transport and buildings and accessibility as a fundamental right.

- Some of the dissertations found deal with subjects rarely studied from the point of view of universal accessibility, such as banking, communication, employment, the home and R&D&I processes.

- The educational institutions which have published the largest number of these dissertations on universal accessibility are the Technical University of Madrid and the University of Granada, followed by the University of Valencia and the Technical University of Valencia.

- In general terms, it can be said that a significant number of dissertations on universal accessibility which were published in Spain between the 1998-1999 and 2017-2018 academic years have been identified, although as a proportion of the total of registered dissertations in TESEO database

the number is minimal. For example, 17,286 dissertations were deposited in 2017, of which only 20 addressed universal accessibility.

- In order to improve accessibility in both physical and digital environments as well as in products and services worldwide, it is essential that universities promote students interest in this field of research.

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Appendix: Identified dissertations on universal accessibility

An Excel document is attached in which the 108 identified theses that address universal accessibility are included (Sheet 1).

On each thesis, the title is provided in its original language, the subject to which it is associated, the author, the year of reading, the university of origin, the URL of access to the file in TESEO and the search strategy applied.

Besides, the names of reference authors consulted in TESEO are provided to know if they have a doctoral dissertation related to universal accessibility (Sheet 2).

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