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Training data journalists. An analysis of postgraduate programs in Spanish universities and the degrees of professionals

Abstract

This article takes a closer look at the training of data journalists by examining in detail the postgraduate courses offered in Spanish universities. The starting point is a systematic compilation of the official degrees in this field that can be found in the databases of the Spanish Ministry of Universities, as well as a comparative analysis of the existing degrees for two academic years (2020/2021 and 2022/2023). This quantitative study is complemented by a survey of Spanish-speaking data journalism professionals about their training. The goal of this research is to shed light on current training in this discipline, which is one of the most promising for the future of journalism. The findings reflect an emerging but still evolving educational landscape consisting of fourteen specialised data journalism degree programmes, all of which will be offered as postgraduate programmes in the 2022/2023 academic year. These postgraduate programmes are primarily internal and offered by private universities. However, our survey of professionals showed that only 7% of communication specialists have training in this journalistic field. Consequently, Spain is one of the countries where data journalism has not yet fully taken hold in newsrooms due to a lack of adequate training and appropriately trained professionals.

Keywords

Data journalism, investigative journalism, journalistic profession, journalism education, syllabi, newsrooms.

1. Introduction

Data journalism is a subfield of journalism that differs from traditional reporting. It retrieves data from large databases and finds information that would otherwise be impossible to obtain. Before its emergence, there was no other field that could handle so much data. As Tong and Zuo put it, “Journalism is always about dealing with data. The scale of data use in data journalism, on the other hand, is unprecedented” (Tong & Zuo, 2019, p. 4). Technology is critical to the collection and visualisation of information. “Surveillance, biometrics, automation, data creeping, or consumer behavior profiling present opportunities and challenges for news reporting” (Fink & Anderson, 2015, p. 467).

This journalistic discipline has not stopped growing in recent years. Data journalism has developed rapidly since 2010, when some pioneers met in Europe (Lorenz, 2010, p. 8). This

year, data journalism came of age with the WikiLeaks war logs from Iraq and Afghanistan and the U.S. embassy cables. “Data-driven journalism is the future,” said the inventor of the World Wide Web, Tim Berners Lee (Arthur, 2010). Perhaps the most famous example of this discipline is the Panama Papers, a major information leak that brought to light individuals with first and last names who had money in tax havens to evade taxes in their respective countries (Obermaier, 2016).

Although data journalism is a new discipline, it builds on long-standing trends, particularly precision journalism, computer-assisted journalism (CAR), and computational journalism (Lee & Fleming, 1995; Yarnall *et al.*, 2008; Hewett, 2016, p. 2; Coddington, 2015). According to Hammond (2017), “it was Philip Meyer’s 1973 book *Precision Journalism* that heralded and propelled the emergence of data analysis as an important part of the journalistic repertoire.” However, according to Appelgren (2017, p. 309), this media shift required new technologies to enter society and newsrooms in particular: “These practices can be linked to other technological changes, such as the use of computers in newsrooms, increased access to electronic resources and archives, open data, and the development of the World Wide Web.” A development that opened up a new way of interpreting information that was previously unthinkable: “Data journalism is not a holistic new genre of journalism, but a journalistic practice that, when applied, can enhance stories with visualisations and allow journalists to include data sources as primary sources that may have previously been considered largely unusable” (Stalph, 2017, p. 1349).

Data journalism combines more than just information science. It also includes sciences like statistics, computer science, the exploitation of large volumes of data, information design and storytelling. Heravi (2018) states that “data journalism promotes a fact-based and scientific approach to journalism. This approach calls for journalism to be treated and practised in the same way as scientific investigations, inviting scientific methods, scientific objectivity, scientific transparency, scientific reproducibility to the process of journalism and mass communication.”

Covid-19 is a prime example of the critical importance of this discipline at a very difficult time for the entire globe. The global proliferation of Covid-19 has allowed government agencies and independent organisations to compile statistics and monitor trends, as Rodríguez and Clark (2021) explain. The mass information about this pandemic has made it easier for journalists to extract the news, compare some countries with others, get detailed summaries of the information, and track how many people were infected, died, and were cured. “Although some of these data are available through public health department websites, relevant interpretation and data visualisations by media outlets have provided information on the Covid-19 pandemic to the public in near real time” (Desai *et al.*, 2021).

According to Hewett (2016), data journalism education has received little attention in the literature until recently, aside from its important precursor, computer-assisted reporting. There is little information about data journalism, its training, and career opportunities in this journalistic discipline. This article, therefore, aims to shed light on one of the problems facing newly graduated journalists: Where can one study data journalism and what are the opportunities? Is there sufficient training in this discipline?

The aim of this study is to present the study opportunities and current courses offered in the field of data journalism for the academic year 2022-2023. To this end, we have established the following goals:

- O1. To research the current graduate programs offered by Spanish universities.
- O2. Analysis of the carriers, modalities, and costs associated with this specialised training.
- O3. Comparison of this offer with the data journalism professional training programs offered in Spain.

2. Literature review

2.1. Teaching data journalism

Nearly a decade ago, a report from UNESCO (Banda, 2013) called for a strategic rethinking of journalism curricula. The organisation argued that there are new specialisations in social, political, economic, and technological fields that are not covered by current journalism education. For this reason, in collaboration with more than 70 journalism training institutions from 60 different countries, they presented those curricula that they believed were adapted to the needs of journalistic enterprises and the evolution of society, including the data journalism curriculum.

Developing a curriculum that includes a subject related to data journalism is a fairly difficult task. The first difficulty encountered in this journalistic discipline is the ephemeral nature of using a technological tool, platform, or programming language. For this reason, Berret and Philips (2016, p. 30), who both teach data journalism, focus on teaching the methodology rather than the various methods of doing data journalism: “Students can learn enough about the concepts behind a technique to more easily learn new tools that deal with the technique rather than focusing on the individual tools that are used from time to time.”

Lewis (2021, p. 78) identifies three main obstacles for colleges in implementing curriculum change: a) lack of qualified instructors; b) uncertainty about the emphasis on skill acquisition when the tools are ephemeral (e.g., Dreamweaver); and c) the debate, sometimes fueled by accreditation restrictions, about whether the new should be integrated into required courses or reserved for electives. Also worth noting here is the difficulty journalism students have in learning the subject. Students are used to working with letters, and dealing with numbers can be a barrier for many young people to not specialise in the discipline. Teachers of data journalism will be familiar with the complaint from students that “I’m not good at maths” or (perhaps more worryingly) “I’m not good with technology.” Data journalism, then, starts at a disadvantage: its biggest names –the likes of Philip Meyer, Adrian Holovaty and Nate Silver (Bradshaw, 2017)– are not names most students would recognise. And big data stories such as the WikiLeaks revelations, Panama Papers and the MPs’ expenses scandal in the UK seem impenetrable and unreachable for the average 19-year-old, something for ‘later’” (Bradshaw, 2018, p. 12).

So, the first thing you should do is break down that barrier by showing them examples of data journalism and explaining how that information came about. That’s the method Paul Bradshaw uses to educate young students in the field and take away their aversion to math. “The first challenge in any data journalism course, then, is to challenge any preconceptions students might have about the discipline and break down the barriers that make it seem like another world, to show that it is not something for ‘someone else’ or ‘another time’” (Bradshaw, 2018, p. 2).

One of the main advantages of data journalism today is that journalism students who want to enter the discipline have a lot to explore and innovate. With digital tools, journalism is redrawing its boundaries, and new careers for journalists are emerging every day that universities should include in their teaching. For Flores and Salinas (2013, p. 16), this is a given: “University plays a fundamental and extremely important role in the training of journalists with a new profile, with a type of knowledge that requires constant revision of the curricula.” There is a need to change the curricula and adapt them to the new niches in the media. As Kashyap and Bhaskaran (2020) argue, the changes brought about by new practices such as data journalism are an opportunity for the journalism academy to take a proactive role in shaping journalistic practices within the media industry.

Several deficiencies were identified at the level of training, but the cause is unknown. Lack of funding, a need for change in the curriculum, or a lack of interest in numbers among journalism students could be the reason. According to Nguyen and Lugo (2016, p. 5), “the

traditional ‘number phobia’ of journalists is not due to statistics *per se*, but to the fact that its essence is either completely misunderstood or understood too narrowly.”

The nature of this specialisation requires immersion in two key aspects: technology and data management, although the majority of research on emerging skills in data journalism agrees that these professionals must maintain the basic principles of journalism—reporting, editing, and networking skills—as well as ethical considerations (Örnebring & Mellado, 2016, p. 1).

Programming and design skills are specific aspects that Appelgren and Lindén (2020, p. 61) highlight in the context of technological knowledge. López-García, Toural-Bran and Rodríguez-Vázquez (2016, p. 292) go a step further, pointing out the need to master the tools of IT, especially those for database management, visualisation, and multimedia narratives. Broussard and Boss (2018, p. 1213) emphasise the importance of mastering frameworks and programming languages such as JavaScript. Technical expertise is required at both the beginning and end of the process (e.g., automated data collection and user interface design) (Boyles & Meyer, 2017, p. 435). These experts also often need other types of innovative skills, such as social media management, web development, content and audience analysis, and programming languages such as Python (Guo & Volz, 2019, p. 1311).

Regarding the second crucial factor, data management, Davies (2018, p. 110) emphasises the importance of overcoming the obsession with mathematics and using these resources for everyday journalism. Appelgren and Lindén (2020, p. 61) extend this view by pointing out the need to be familiar with investigative journalism methods, statistics, data management, and statistical reporting. In this sense, well-trained journalists are more valued. Along these lines, Weiss and Retis-Rivas (2018, p. 3) defend the need to dispel “the notion that maths and statistics are ‘not in the journalist’s wheelhouse.’” This is especially true now that simplified tools are removing certain technological barriers, so editors are placing greater importance on the ability to find topics from vast amounts of data (Arias-Robles & López López, 2020, p. 10).

Training is essential for handling data and technological resources. Heravi *et al.* (2018, p. 112) found that the data journalism community tends to be highly educated and its roots are primarily in journalism and communications degree programmes, as opposed to data science or computer-related fields. Although technical, data analytics and statistical skills do not appear to be strengths that participating journalists cite as part of their journalism experience, many newsrooms appear to already have a dedicated data team and/or regularly produce data-driven stories. Burns and Matthews (2018, p. 94) argue that these new concepts should be taught to journalism students from the beginning of their studies, as should the use of primary and secondary sources.

2.2. Spanish experiences and the global scene

In Europe today, there are opportunities for journalists who want to get trained in data journalism. According to Splendore *et al.* (2016, p. 2), there are professional companies and civil society groups committed to training in data journalism: “Non-academic institutions (such as the European Journalism Centre or the Centre for Investigative Journalism) and major international news outlets (such as *The Guardian* and *The New York Times*) appear to be taking a leading role in all the countries studied. One example of such a civil society organisation is Hacks/hackers, a group that was founded in the United States in 2009 but soon spread around the world, especially in Europe. Hack/hackers is a group of computer scientists and journalists who work together to find new journalistic formats. “The case of Hacks/hackers provides an opportunity to examine the extent and nature of interactions between the fields of computer science and journalism—interactions that academics and practitioners alike believe should be critical to the future of journalism” (Cohen, Hamilton & Turner, 2011; Flew *et al.*, 2012).

Despite the lack of information on training in data journalism, there are some studies that analyse this issue in different countries. On a global level, Heravi (2018) conducted a study of postgraduate data journalism courses and concluded that “148 of the courses are in the United States, 8 in Canada, leaving a total of only 63 courses and programmes outside North America that offer data journalism-related topics [...] But outside North America, the countries with the highest number of data journalism-related modules and programmes are the United Kingdom, the Netherlands, Ireland and Australia” (Heravi, 2018, p. 12). As Heravi notes, the greatest amount of training is currently available in the United States. This is contradicted by Berret and Phillips (2016), who conducted a study of 113 U.S. journalism schools, 59 of which offered one or more courses in data journalism: “At a minimum, these programmes offer courses that teach students to use spreadsheets to analyse data for journalistic purposes. At the other end of the spectrum, some schools provide far more, teaching multiple classes in programming skills, such as scraping the Web, building news apps, or creating advanced data visualizations. But programs with multiple classes are rare.”

In Spain, we can refer to the study of Chaparro (2014), who explains that in the 2013–2014 academic year there was hardly any training in this journalistic discipline. There were no single-subject courses on data journalism in the generalist master’s programmes. The only monographic master’s programme was called Investigative Journalism, Data and Visualisation and was offered by Universidad Rey Juan Carlos and Unidad Editorial for the first time in the 2012–2013 school year. “In light of our analysis, we note that there are few university educational initiatives in Spain that focus on teaching data journalism. One of the reasons for this could be the complexity of teaching about the use of computer tools, which are constantly evolving” (Chaparro, 2014, p. 50).

In 2019, López (2019) analysed the bachelor’s and master’s degrees from all Spanish universities in the 2017–2018 academic year. López notes that in 2017–2018, there were only four postgraduate programmes that specialised in data journalism, and that this training took place mainly in private universities. Graduates had the following training in data journalism: at Rey Juan Carlos University, the Master’s in Investigative Journalism, Data and Visualisation; at Villanueva University Centre, the Master’s in Data Journalism; at La Rioja International University, the University Master’s in Investigative Journalism, Data and Visualisation; and at Universitat Oberta de Catalunya, the University Master’s in Journalism and Digital Communication: Data and New Narratives.

Another recent study comes from Saavedra *et al.* (2020), who analyse the existing undergraduate and postgraduate degrees in data journalism for the 2019–2020 academic year. The authors note that the number of degrees in data journalism has increased in recent years, although they point out that the supply remains low compared to the total number of master’s degrees in journalism. Their study shows that there are only 6 postgraduate degrees focused on data journalism in the 2019–2020 academic year.

3. Methodology

The methodology used for this study is content analysis, which Wimmer and Dominick (1996, p. 170) define as “a method for the systematic, objective, and quantitative study and analysis of communication with the aim of measuring specific variables.”

Following the methodology of Heravi (2018) and Tejedor (2006), this study focuses on a comprehensive investigation of postgraduate programmes that train data journalism in public and private universities in Spain. For this study, the academic years 2020/2021 and 2022/2023 were analysed comparatively. Data were obtained from the websites of master’s programmes in journalism and from the information provided by the Ministry of Universities in its online application QUEDU (section: What and Where to Study at University). In addition, they were supplemented by a qualitative analysis: a direct observation of the sites of the different universities and the main media companies was carried out. The reason for studying the

media outlets is that, as Kashyap and Bhaskaran (2020) describe, “this apparent imbalance between the media industry requirements and academic curriculum has resulted in the mushrooming of media-backed institutions” (2020, p. 4). “Therefore, direct observation of media institutions that train journalists is considered appropriate. According to Wimmer and Dominick (1996, p. 148), “direct observation often helps establish basic contextualisation information to form a hypothesis or isolate dependent and independent variables.”

To the global corpus of all master’s degrees that exist in the field of communication, provided by the Ministry of Universities, additional training is added through the review of the websites of Spanish universities. After this review, we found six additional titles in the 2020/2021 programme and seven additional titles in the 2022/2023 programme that are not included in the Ministry of Universities’ register but were added to the sample.

With the sample of all master’s programmes, we conducted a content analysis of the curricula for each subject in all programmes, focusing only on those teaching data journalism. We considered master’s programmes that included at least one “data journalism” course or one of the areas defined by Splendore *et al.* (2016, p. 141), “including all phases of data production: processing, collecting, analysing, and visualising data”.

After conducting a content analysis and comparative analysis of our dataset, fourteen data journalism degrees were selected for the 2020/21 to 2022/23 academic years. Based on Sánchez (2013), the lines of analysis and variables for these fourteen courses were compiled in the following table.

Table 1. Comparative analysis of Master’s programmes offering training in data journalism.

Ownership	Public	Private	
Official	Yes	No	
Type of training	Only one subject	Whole curriculum	
Participation	Face-to-face	Online	Blended
Price (€)	1500-3000	3001-7500	> 7500
Academic year	2020/2021	2022/2023	Both

Source: Own elaboration.

The following is a description of the lines listed in Table 1. These master’s degrees are owned by either public or private universities. The official status of a master’s degree depends on whether it is an official master’s degree or a university-owned degree. Training includes the space allocated for teaching data journalism, whether the master’s degree is for one or more subjects only or is specific to data journalism; the training mode is the format in which the master’s degree is taught; we have considered face-to-face, online, and blended. The training budget is the total cost of the training (both modes). The cost of the master’s degree was another factor we wanted to examine. Since the cost of each master’s degree varies, we identified three price ranges. A first range of 1,500 to 3,000 euros, a second range of 3,001 to 7,500 euros, and a third range that included titles worth more than 7,500 euros. And finally, a line describing the course of study in which this master’s degree was taught: 2020/21, 2022/23, or both.

It should be noted that only the master’s degrees belonging to the field of communication were selected, since in the field of computer science there is another figure of the data scientist, that is different from that of the data journalist.

This quantitative sample is complemented by a series of surveys conducted among data journalists working in the main Spanish-language media. In total, the sample consisted of 211 communications professionals. The surveys were conducted between January 2019 and August 2020 via a Google form. A total of four questions were related to the formal and informal training of data journalists, as well as their professional profile. The aim was to find out what training data journalists currently working in the media have, and to reflect on the relationship between what is on offer and journalists' actual CVs.

4. Results

4.1. Analysis of data journalism training courses for the academic years 2020/2021 and 2022/2023

After conducting this research and compiling our dataset, we identified 13 degree programmes offering data journalism for the 2020/21 academic year and 14 titles for the 2022/23 academic year.

Table 2. Postgraduate education in Spanish universities.

Name of the Master	University	Ownership	Official	Participation	Type of training	Price (€)	Academic course
Journalism and Data Visualisation	UAH	Public	No	Online	Whole curriculum	3001-7500	Both
Master in Investigative Journalism, New Narratives, Data, Fact-checking and Transparency	URJC/ Maldita.es	Public	No	Face-to-face	Only one subject	> 7500	2022/ 2023
Master in Digital Culture and Emerging Media	UPF	Public	No	Face-to-face	Only one subject	1500-3000	2022/ 2023
Master in Digital Verification, Fact-Checking and Data Journalism	CEU/ Newtral	Public	No	Blended	Only one subject	3001-7500	Both
Master in Professional Multimedia Journalism	UCM	Public	Yes	Face-to-face	Only one subject	1500-3000	Both
Master in Data Journalism and Fact-Checking	URLL	Private	No	Blended	Only one subject	3001-7500	Both
Master in Interactive New Media and Multimedia Journalism	UGR	Public	Yes	Face-to-face	Only one subject	1500-3000	Both
Master in Communication and Data Visualisation	UNIR	Private	No	Online	Only one subject	3001-7500	Both
Master in Innovation in Journalism	UMH	Public	Yes	Online	Only one subject	1500-3000	Both
Master in Digital and Data Journalism	Nebrija/ <i>20 minutos</i>	Private	Yes	Blended	Only one subject	3001-7500	Both
Master in Digital Journalism and New Professional Profiles	URJC	Public	Yes	Face-to-face	Only one subject	1500-3000	Both
Master in Investigative Journalism, Data and Visualisation	UFV/ <i>EL Mundo</i>	Private	No	Face-to-face	Whole curriculum	> 7500	Both
Master in Journalism and Digital Communication: Data and New Narratives	UOC	Public	Yes	Blended	Only one subject	1500-3000	Both
Multimedia Journalism	VIU/ Atresmedia	Private	No	Online	Only one subject	3001-7500	2020/ 2021
Master in Journalism	UAM/ <i>El País</i>	Public	No	Face-to-face	Only one subject	> 7500	Both

Source: Own elaboration.

As shown in the table, the number of available courses has increased with each academic year. In the 2020/2021 academic year, there was one master's programme that will no longer be offered in the 2022/2023 academic year, while two new programmes will be added. The Master's degree in Multimedia Journalism, offered jointly by the International University of Valencia and Atresmedia, will no longer be offered in the 2022/2023 academic year. This master's programme was not specifically focused on data journalism but included an ECTS course on the subject worth six credits.

If we carefully examine the master's programs that will be offered in 2022/2023, we discover that they have various modalities of participation. We divided them into face-to-face, online, and blended. Seven of the 14 courses are offered only in person (50%); three are offered exclusively online (21.43%); and four provide both options (face-to-face and online courses; 28.57%).

Looking more closely at the training content, we find that only two of the 14 courses (14.29%) are exclusively limited to training in the journalistic specialty of data journalism; the remaining master's courses offer more general training in data journalism, and many of them together with other journalistic specialties such as fact-checking.

The cost of these degrees varies widely. The cheapest are the official master's degrees from public universities, which usually cost between 1,500 and 3,000 euros. After that, they vary between 3,000 and 7,500 euros. Here are five degrees that public and private universities have developed in collaboration with media companies. Last but not least, there are the degrees that cost more than 7,500 euros, namely: the Master's in Journalism of the Autonomous University of Madrid in partnership with the *El País* School; the Master's in Investigative Journalism, Data and Visualisation of the UFV with *El Mundo*; and the Master's in Journalistic Research, New Narratives, Data, Fact-Checking and Transparency of the URJC with Maldita.es. These three costs 13,300, 9,000 and 10,000 euros, respectively.

Each of the degrees offered in the 2022/2023 academic year is now described in more detail. The University of Alcalá added the Master's degree in Journalism and Data Visualisation to its curriculum in 2020/2021. It consists of 60 ECTS, is fully online and focuses exclusively on data journalism. It is a Master's degree consisting of ten working modules, including: Data Processing Techniques, Data Science Techniques, Interactive Systems on the Web and Interactive Visualisation. The Master's website states that the modules are based on real projects carried out by the teaching team or others.

The University Rey Juan Carlos in Madrid and the Maldita.es Foundation have launched the second edition of the Master's degree in Investigative Journalism, New Narratives, Data, Fact-Checking and Transparency for the academic year 2022/2023. This training takes place in Madrid and includes a module "Data Journalism and Transparency" worth 11 ECTS.

Since January 2021, CEU San Pablo University has offered a face-to-face Master's degree in collaboration with the media company Newtral.es. The Master's in Digital Verification, Fact-Checking and Data Journalism dedicates a large part of the programme to data journalism, but is not exclusively focused on this discipline. One of the five modules that make up the master's is dedicated to data journalism: Module 3: Data Journalism, Media Convergence and Transmedia Narratives, with the specific topics: 'Data Journalism and Transparency' and 'Tools for Working with Data and Visualisation'.

Another institution that teaches data journalism is the Complutense University in Madrid. This centre offers a Master's degree in Professional Multimedia Journalism, which was recognised as an official degree in 2007. This degree is not focused on data journalism, but it includes a six-credit course on data journalism and social networks. This subject defines this discipline as well as the main digital tools used in data journalism and the basic elements of data visualisation.

The University of Blanquerna (Universitat Ramon Llull) offered a Master's degree in Data Journalism and Fact-Checking for the first time in the 2020/2021 academic year. The programme combines data journalism with fact-checking and is worth 60 ECTS. This Master's degree includes two modules that cover two-thirds of the training in data journalism: Module I. Introduction to Data Processing (14 ECTS) and Module II. Data Journalism and Visualisation (10 ECTS).

At the University of Granada, the Master in New Interactive Media and Multimedia Journalism also offers training in data journalism. This Master, now in its eighth edition, includes a face-to-face course on Infographic and Information Visualisation (3 ECTS).

Another school that trains students in this field is the International University of La Rioja (UNIR). It has been offering an online Master's in Communication and Data Visualisation since the 2020/21 school year. This course replaces the Master in Investigative Journalism, Data and Visualisation, which is being phased out. This postgraduate course focuses more on data visualisation and has learning topics for static, dynamic and animated visualisations.

There is also a Master's degree in Innovation in Journalism at Miguel Hernández University in Elche. Even though it doesn't focus on data journalism, one of the courses with 6 ECTS credits is called New Multimedia Narratives and Data Journalism. It is mostly about transparency, getting information and looking for it, data scraping, data cleaning, information analysis, and visualising data.

The University of Nebrija is another institution that teaches data journalism in collaboration with the newspaper *20 Minutos*. In 2014, the Master's degree in Digital and Data Journalism was approved. It can be completed in both face-to-face and online modes. It comprises 60 ECTS credits and is not limited to data journalism. There are only two subjects that focus on this discipline: Data Journalism I: Sources and Data Processing and Data Journalism II: Digital Tools for Visualising and Presenting the Data.

The Master's degree in "Digital Journalism and New Professional Profiles" is offered at the University Rey Juan Carlos (URJC). This degree includes 60 ECTS credits and is offered as a face-to-face course only. This Master's, approved in 2018, includes a subject called Data Journalism. In this subject, students learn how to extract and analyse data.

The University Francisco de Vitoria, on the other hand, offers a Master's degree in Investigative Journalism, Data and Visualisation in collaboration with the newspaper *El Mundo*. This is a degree programme that specialises in data journalism. It has been offered since 2013-2014. It consists of seven modules, the last of which is a six-month paid internship. It consists of the following modules: Investigative Journalism, Data Journalism, Right to Know, Data Visualisation, Access to Publishing on *masinvestigacion.es*, the Master's thesis and the paid internship.

The Master's degree in Journalism and Digital Communication: Data and New Narratives corresponds to the Universitat Oberta de Catalunya. It includes 60 ECTS credits and is an official online programme. Although it focuses on data journalism, it is broader in scope as it includes three areas of specialisation: Data Journalism, Research and Entrepreneurship, and New Business Models. Depending on the electives the student chooses, they will focus their education on one of these three areas. There are three subjects that focus on data journalism: Data Journalism, Data Analysis and Visualisation, Advanced Data Analysis and Visualisation Techniques. In the context of new multimedia narratives, it also includes mobile journalism (MOJO).

In collaboration with the Autonomous University of Madrid, the newspaper *El País* offers a Master's degree programme in journalism. This 22-month programme includes a module on Data Visualisation and Analysis. According to its website, this module aims to teach students how to use tools that allow them to search for information and present it in an understandable way.

Another degree programme offered by Pompeu Fabra University is included in the 2022-2023 academic year. This Master's programme is taught in English and is titled Digital Culture and Emerging Media. It's worth 60-credit and includes a block on Data Analysis and Information Visualisation Related to Global Issues (5 ECTS).

4.2. Surveys of professionals

Surveys of Spanish-speaking data journalism professionals in Spain and Latin America show that the average data journalist has a bachelor's degree in communications, a master's degree with little specialisation in data, and no doctorate.

Table 3. Basic training for data journalists.

Bachelor	N	%
Journalism	118	55.9
Communication	37	17.5
Engineering	22	10.4
Statistics, Mathematics, and Physics	7	3.3
Design and fine arts	8	3.8
Geography, History, Philosophy, and Philology	8	3.8
Other	11	5.2
Total	211	100

Source: Own elaboration.

More than half of the respondents have degrees in journalism, and 73.4% work in communications. Technical degrees, especially in engineering (10.4%), are also on the rise. Underrepresented are degrees in the arts, humanities, and social sciences. In this hybrid field of journalism, professionals more accustomed to working with data meet those trained to find and tell stories.

Table 4. Advanced training of data journalists.

Master's or postgraduate degree	N	%	% (with degree)
Journalism	75	35.9	54
Data and investigative journalism	9	4.3	6.5
Communication	16	7.7	11.5
Economics, management and business	6	2.9	4.3
Engineering	6	2.9	4.3
Design	5	2.4	3.6
Visualisation	4	1.9	2.9
Statistics and data science	3	1.4	2.2
Other	15	7.2	10.8
ND	75	34.9	
Total	211	100	100

Source: Own elaboration.

Table 4 shows the potential for growth in the specialisation and ongoing education of data journalists. Almost one-third of the 211 respondents do not have a university degree. The numbers become even clearer when we look more closely at the focus of the continuing education programmes. While two-thirds of respondents have postgraduate degrees in journalism or communications, only 6.5% specialise in data and investigative journalism. Among the remaining programmes, business and engineering degrees stand out, but programmes specialising in visualisation or data science are rare.

Table 5. Advanced training.

Phd	N	%
No	183	86.8
Yes	23	10.9
ND	5	2.3
Total	211	100

Source: Own elaboration.

Finally, the survey shows that only a small percentage of professionals in the field have completed the highest level of academic training. Only about one-tenth of communications professionals working in data journalism have a doctorate. However, this number is higher than the industry average of 8% (APM, 2020, p. 27).

5. Discussion

It is difficult to change curricula. This has also been noted by Lewis (2020), who points to challenges such as the difficult task of finding qualified teachers and whether data journalism should be included in curricula as a required or elective subject. Despite these problems, Heravi (2018) shows that data journalism education is strong in the United States and Europe.

This study identified 14 postgraduate data journalism courses for the 2022/2023 academic year and 13 for the 2020/2021 academic year. Only two of these courses dealt exclusively with data journalism: the Master's degree in Investigative Journalism, Data and Visualisation from *El Mundo* and the master's degree in Journalism and Data Visualisation from the University of Alcalá. The remaining courses offered a general overview of data journalism and included one or more data journalism modules.

Based on these data and comparisons with other researchers who have conducted similar analyses, we can confirm that data journalism training is flourishing in Spain. In the academic year 2020/2021 alone, three new degrees have been added compared to the previous year: the Master of Data Journalism and Fact-Checking at Blanquerna University, the Master of Communication and Data Visualisation at UNIR, and the Master of Digital Verification, Fact-Checking, and Data Journalism at CEU San Pablo University. According to Chaparro (2014), in 2014 there were four postgraduate programmes that included a data journalism theme and only one monographic postgraduate programme: Investigative Journalism, Data and Visualisation, offered by Universidad Rey Juan Carlos and *El Mundo*; a Master's degree that is still available today. In the most recent study by Saavedra *et al.* (2020), only six postgraduate courses were found in the 2019–2020 academic year. If we compare our sample of 2020/2021 with that of 2022/2023, we see that we have lost a degree that existed in 2020/2021 but is no longer available, namely the Master in Multimedia Journalism from VIU and Atresmedia. Two new specialisations in data journalism were added to the list: the Master in Investigative Journalism, New Narratives, Data, Fact-Checking, and Transparency from URJC and Maldita.es, and the Master in Digital Culture and Emerging Media from UPF. It can be concluded that the number of new data journalism courses has increased significantly in recent years. We believe that this discipline is still in its early stages at the educational level, and that each year the number of courses that train this area, either as a subject or as a specific module, will increase.

This analysis also shows that some news organizations, like *El País*, *El Mundo*, Newtral, and Maldita.es, have developed their own training on data journalism. As can be seen, the media is also confronted with new technological challenges.

Although there is an abundance of educational opportunities, public universities do not offer postgraduate programmes that exclusively teach data journalism. The official postgraduate programmes studied offer only one subject in data journalism: the Master's in

Professional Multimedia Journalism at UCM, the Master's in Innovation in Journalism at UMH, the Master's in Digital Journalism and New Professional Profiles at URJC, and the Master's in Interactive New Media and Multimedia Journalism at UGR. In addition, there is a need for lower-cost and more affordable training in lieu of formal master's programmes at private universities, which represent the majority of existing options. Prices for these trainings vary widely, from the cheapest option, the official Masters, to prices that are not very affordable for most students, such as UFV's Master's degree in Investigative Journalism, Data and Visualisation, which costs 9,000 euros.

In any case, these differences become even more apparent when we focus on postgraduate degrees. Of the Spanish professionals as a whole, slightly more than one-third (37%) have such training (APM, 2020); of the professionals surveyed, nearly two-thirds (65.1%) have degrees beyond a bachelor's degree. However, only a small percentage of these degrees (6.5%) specialise in data or investigative journalism. On the one hand, this clearly reflects the interest of these professionals in improving their education. On the other hand, it is a clear example of the novelty, lack, or inadequacy of specialised training in data journalism. This could also be due to socioeconomic constraints, such as the cost of some programs or the geographic concentration of their locations (Flores-Vivar & López-López, 2020, p. 91). It should be recalled that only two of these programs were exclusively dedicated to data journalism, which is evidence that these programs still have room for improvement.

Although there are not many PhDs among the respondents, there are more than twice as many as in other studies in this field in Spain (Tomás Frutos, 2008, p. 97). Although the respondents had a high level of formal higher education, only about a third of them had attended specialised courses or participated in other programs, which shows that there is still much opportunity for improvement in the consolidation and diversification of specialised training in this field (Heravi, 2018).

There is a clear need for training in data journalism for journalists in newsrooms. With this training, they would be able to produce different, more exclusive narratives that appeal to increasingly sophisticated and digital audiences. In order to train journalists in this discipline, it is considered necessary to offer more targeted training in data journalism at a lower cost and with an official qualification. We aim to provide students, academics, and communications professionals with tools to push the boundaries of journalism today.

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