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Miscellaneous

Technological Skills Demanded in Job Postings for Journalism Graduates in Spain

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Abstract

Due to the digitalisation of communication-related productive sectors (journalism, advertising, audiovisual creation, corporate and strategic communications, etc.), having up-to-date technological skills is crucial for joining and remaining in the labour market. In this study, the technological skills demanded from Journalism graduates in Spain by potential employers are analysed using a sample (n=433) of job postings aimed at such graduates on the specialist online platforms LinkedIn and Infojobs. The results show that the labour market available to Journalism graduates is broadly shared with graduates in other disciplines (especially Advertising and Public Relations, and Marketing). Only about 8% of the job postings analysed came from media outlets. Almost 70% were addressed to graduates in Journalism or other graduates in the field of communication and marketing, and only about 20% demanded functions connected with the production of journalistic information. Regarding the technological skills sought, about 60% of the job postings demanded knowledge of at least one specific technological tool, mainly for the tasks of graphic design, layout and image editing; data processing; web content design and management; text editing and presentations; web analytics; and social media. The results suggest that the variety of technological tools used in Journalism university programme teaching will need to be increased in order to facilitate graduate employability.

Keywords

Employability, Journalism graduates, technological skills, labour market, job postings, technologies, Journalism teaching.

1. Introduction

The growing implementation of technologies has piqued academic interest in technological devices, services and interfaces, as well as an increased awareness of the material dimension of communication infrastructures (Deuze, 2012). Such interest has become even greater due to the rapidly spreading use of artificial intelligence (AI) and its application to communication (Ai4mediam, 2020; European Commission, 2022).

In the area of journalistic activity, technologies are redefining organisational structures, the media, the participatory nature of journalism, and content (Pavlik, 2015). Technologies determine what is newsworthy, influences ways of working and it has also generated a

reconceptualisation of the audience, which now consists of a more active and individualised public (Zamith & Braun, 2019). Tools, software and analytics inevitably end up shaping aspects of editorial content (Bell, 2019), thus determining the formats used. Indeed, it has been found that editors adapt their content to Facebook and Instagram and gradually innovate their practices to improve the production and distribution of video on both platforms (Chua, 2023). It has also been reported that technologies such as Chartbeat are used in media outlets' newsrooms to learn about users' real-time interactions with published content in order to attend to their interests (Gómez Diago & Martínez Nicolás, 2023).

Besides the influence that technological tools have on journalistic work, the digitalisation of communication has brought new actors into the fold of content creation. The resulting media ecosystem hosts and generates different forms of communication, media and platforms that compete for users' attention. Within this context, where Facebook and Google monopolise the lion's share of digital advertising (Abernathy, 2020), Journalism graduates can see how the working conditions in the available labour market have declined. That labour market presents itself as a sort of continuum, on which tasks deemed specifically "journalistic" overlap with other activities related to public communication in general, and corporate, institutional and strategic communications in particular (Martínez Nicolás, 2023). Under these circumstances, several recent studies have found that, compared to other skills, technological ones will become more important for graduates in different areas of communication (AQU, 2022; Jaakkola & Uotila, 2022).

This study analyses the technological skills demanded by companies offering jobs for Journalism graduates in Spain, based on 433 job postings on LinkedIn and Infojobs. The analysis of job advertisements enables the characteristics of the labour market to be identified, the emerging changes in the journalism industry to be detected, and students and lecturers to be provided with information about the qualifications sought by employers (Guo & Volz, 2020). Knowing what technological skills are required in job postings available to Journalism graduates enables at least two objectives. On the one hand, the required technological skills are an indicator of the activities deemed the most relevant and, on the other, it enables teaching initiatives to be generated in order to correct the low level of importance that these degrees place on technological skills compared to that placed on what they deem necessary for professional performance (Gómez Calderón *et al.*, 2020; Rodríguez Pallarés & Segado, 2020).

The results obtained show that about 60% of the job postings available in Spain for Journalism graduates on the job portals LinkedIn and Infojobs require the command of at least one specific technological tool. The analysis shows the variety of technologies required in the area of communication, as well as the interest that firms display in developing and promoting web content, handling data, applying analytics and generating communications for marketing and advertising purposes. In short, the study provides empirical evidence that can help not only in understanding the labour market available to Journalism graduates, but also interesting knowledge for lecturers on Journalism degrees to be able to decide on the technological skills they teach to future professionals based on which ones their potential employers require them to have a knowledge of.

2. Demand for labour and technological skills education in journalism

The media's demand for technological skills has increased considerably since 1990 (Pierce & Miller, 2007), when journalists were required to be trained in HTML, know how to publish content on the web, edit images and video, handle content management systems, and use social media and word processors (Carpenter, 2009). Later studies found that a knowledge of specific technological tools such as InDesign, Illustrator, Avid, Photoshop and Final Cut was more in demand (Massey, 2010; Young & Carson, 2018).

Depending on the type of media outlet, a knowledge of different technological tools was required (Wenger & Owens, 2012) and, with the proliferation of digital media, web

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competencies (specifically, posting material on the web and writing for the web) have grown in importance (Wenger & Owens, 2013). Similarly, recent studies have observed an increase in demand for multimedia competencies (Guo & Volz, 2019, 2020), with these skills being understood as the ability to work with software such as Final Cut, Adobe Creative Suite, Axis Graphics, WordPress, Live Tech and Google Analytics; to handle HTML, CSS, JavaScript and Python; to work with big data; to perform web development; to use DSLR (Digital Single Lens Reflex) cameras; to create documents for a variety of platforms, including mobile ones; and to work on social media.

Regarding the journalism labour market in Spain, Palomo and Palau Sampio (2016) found that graduates needed to have a command of Excel, Photoshop, and editing and layout programs; to be able to handle social media; and to have a knowledge of SEO and Marta Lazo *et al.* (2018) observed that the most highly valued skills were a command of design and of editing programs, and the use of social media.

There is abundant scholarly literature addressing the technological skills required by the professional journalism sector, either from a broad perspective (López-García *et al.*, 2017; Jae & Fink, 2021; Bosley & Vallance, 2022) or one focusing on specific technologies such as AI (Túñez *et al.*, 2018; De Lara *et al.*, 2022) or data journalism (Zhang & Chen, 2020). However, an extremely changing media and technological landscape makes it hard for the education of future professionals to be able to respond to employers' demands, which manifests itself as a gap between university offerings and labour market requirements (Sánchez Gonzales & Méndez Muros, 2014), and specifically between the technological skills that employers and educators deem the most important (Finberg & Klinger, 2014).

The implementation of European Higher Education Area (EHEA) in the mid-2000s aimed to align university education more closely with the demands and needs of society and the productive sectors (Casero *et al.*, 2013), placing the university graduates' acquisition of professional competencies at the heart of the teaching-learning process. Understood as a set of knowledge, skills and personal attributes needed to produce effective professional behaviours (Tech & Moreno, 2015), competencies are a bridge between university and the labour market (Schena *et al.*, 2018).

As part of these competencies, and specifically in relation to the professional communication sector, having technological skills is currently a gateway into the labour market (Lowrey & Becker, 2001; Gersamia & Torzade, 2018; Örnebring, 2018) and a necessity in terms of remaining within an extremely competitive area of work (Jae & Fink, 2021). Studies referring specifically to the field of journalism show that the profile currently being demanded is that of adaptive and versatile journalists (Palomo & Palau Sampio, 2016) who are able to look for, process and distribute multimedia content, interact with audiences, and make extensive use of the technological tools particular to the digital environment (Marta Lazo *et al.*, 2020).

While it is necessary to meet the requirements of the labour market without fully adapting to the industry's interests (Folkerts *et al.*, 2013), analysing job postings enables information to be obtained about the technological skills sought by firms and how the needs and demands of the sector are changing because job advertisements are the "labour market 'voice' of employers" (Massey, 2010). Studying job postings enables us to get insights into the professional profiles that employers are looking for, and they allow us to transfer the knowledge obtained to the educational environment, connecting scholarly research, teaching and the labour market. The analysis of job advertisements has been used more and more often in journalism research, and the study by Russial and Wanta (1998) was pioneering in this sense. It found that photojournalists were expected to scan negatives, use Photoshop and graphic design software, use digital archives and cameras, and prepare web photos. In accordance with this interest, in recent years the analysis of job postings has been applied to find out the professional profiles and skills required to Journalism graduates, both those posted in online platforms (Palomo & Palau Sampio, 2016; Marta Lazo *et al.*, 2018) such as those published by

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journalist companies through their own communication channels (Carpenter, 2009; Massey, 2010; Wenger & Owens, 2012, 2013; Wenger *et al.*, 2014; Wenger *et al.*, 2018; Young & Carson, 2018; Guo & Volz, 2019; Powers, 2021).

Many previous studies on the technological skills that employers are looking in Journalism graduates have focused on job advertisements posted by media outlets themselves. Thus, job postings aimed or not at Journalism graduates for work in corporate communications generally, but also in advertising, public relations and marketing, have tended to be excluded from the analysis of this issue, despite the fact that available empirical evidence suggests that these are the majority of job opportunities for Journalism graduates (Koch & Obermaier, 2014; Viererbl & Koch, 2019). Consequently, there is a paucity of empirical studies on the labour market accessed by Journalism graduates through job portals, which is potentially shaped not only by the jobs that journalistic media outlets post, but also by every job posting in which having a Journalism degree is demanded.

Meanwhile, previous studies on the technological skills sought from Journalism graduates by potential employers are usually limited to identifying the tools that such graduates are required to have a knowledge of. However, it is of interest to determine whether there are any differences between the required skills depending on the professional area and/or specific job posted. Furthermore, from the perspective of institutions dedicated to educating future journalism professionals, it is necessary to know how accessible, in terms of cost, the tools of interest to firms are. For those institutions in general, and for public universities in particular, paying for usage licences and even seeking agreements with software manufacturers to use their technological products in teaching is often complicated.

3. Objectives

In this study, the technological skills demanded by firms in job postings aimed at Journalism graduates in Spain are analysed. To that end, the following objectives were established:

O1. To briefly characterise the Spanish labour market accessible to Journalism graduates through job portals.

O2. To establish a typology of the technological tools demanded by employers, and to identify the specific tools that Journalism graduates are required to have a knowledge of.

O3. To determine the professional areas and specific jobs for which the demanded technological skills are required.

O4. To determine the accessibility, in terms of cost, of the technological tools that Journalism graduates are required to be able to handle.

4. Method

To respond to these objectives, a content analysis of a sample of job postings aimed at Journalism graduates on the specialist online platforms LinkedIn and Infojobs between mid-May 2021 and late February 2022 was performed. With over 800 million registered users, LinkedIn is the most popular professional social media platform worldwide (Pinho *et al.*, 2019) and Infojobs is the employment platform with the highest traffic in Spain (Infojobs, 2022). Online platforms in general, and LinkedIn and Infojobs in particular, are crucial tools for Communication degree graduates in Spain when it comes to looking for work (García Galera *et al.*, 2023).

4.1. *Obtaining the sample units (job postings)*

The state of alarm in Spain due to the COVID-19 health crisis ended in early May 2021. This meant that the labour market could be reactivated and also determined the start of sample collection. To obtain a diverse sample of a job postings over time, and therefore not affected by seasonality, three sub-samples were taken at different stages between May 2021 and

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February 2022: the first before the predictable labour market standstill due to the summer season, between mid-May and late June de 2021; the second when economic activity resumed, between mid-September and late October; and the third after the end-of-year festive period, between mid-January and late February 2022.

The job postings were identified by reviewing the categories that the aforementioned online platforms specifically dedicated to job advertisements connected with the professional areas of journalism. The following categories were reviewed on LinkedIn: journalism, digital journalism, audiovisual journalism, sports journalism, investigative journalism, travel journalism, fashion journalism, economic journalism, and journalist. And those reviewed on Infojobs were: newspaper editor, sports journalist, political journalist and news reporter. Besides this procedure, the terms "journalism" and "journalist" were entered into the selected platforms' search bars, and those job postings that explicitly included the requirement to have a bachelor's degree or university studies in Journalism were also collected. After removing the duplicates, a sample of 433 job postings was obtained. These were posted over four and a half months during the nine-and-a-half-month period analysed (45% of this time period). As we did not know what the sampling base was (total number of job postings for Journalism graduates on both platforms over the period analysed), the resulting sample was non-probabilistic, following a strategic sampling procedure that is usual in content analysis in the field of communication (Igartua, 2006, pp. 212-213).

4.2. *Data coding*

A coding sheet was created and used to collect data on five variables relating to the job postings: "type of employer," "required qualification," "professional area," "job" and "demanded technological tools." The first three were categorised in advance, whereas inductive categorisation was chosen for the last two (i.e., after data collection) given the difficulty in foreseeing their empirical variability. For the "type of employer" variable, the following categories were established: "media outlets," "communication agencies," "institutions/ associations/NGOs" and "firms in other productive sectors." For "required qualification," a record was made of whether the job posting was aimed exclusively or otherwise at Journalism graduates. Regarding the "professional area" connected with the job posted, it was categorised based on the proposal by Marta Lazo *et al.* (2018) and three categories were distinguished: "journalistic information," when the professional functions required in the job posting were related to the production of topical information, be it generalist or specialist (e.g., fashion, cybersecurity, medicine, etc.); "corporate communication," when those functions were connected with the internal or external communications of the firms posting the job; and "advertising and marketing," in which a record was made of those job postings whose tasks were aimed at the promotion of brands, products or services, generally for clients of the firms posting the job.

To code the "job" variable, the titles given in the job advertisements were collected in a literal manner. Given the diversity and lack of precision that emerged from the dataset, they were grouped by a criterion of affinity between the required professional functions by following a comparative and iterative process between coders (Saldaña, 2015). This procedure enabled the generation of the following categories: "journalist," "content creator/manager/editor," "copywriter," "technical writer," "designer," "communication specialist/executive/director," "marketing specialist/executive/director," "public relations specialist/executive/director," "account director," "SEO/SEM/ASO specialist," "social media manager" and "data analyst." As an example of that procedure of grouping by functional affinity, which was established by consensus between coders, included in the "content creator/manager/editor" category were job postings identified as "content creator," "content manager," "content expert," "content developer" or simply "content editor" or "content writer."

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Following the same inductive process, a record was made of the technological tools, a knowledge of which was required in the job postings analysed, and a typology was subsequently generated. That typology included 23 categories into which the tools identified in the advertisements were coded: 1. Aggregators; 2. Web analytics; 3. Databases; 4. Cybersecurity; 5. Purchasing; 6. Graphic design, layout and image editing; 7. Web content design and management; 8. Text editing and presentations; 9. Audio and video recording, editing and streaming; 10. Online file transfer; 11. News management; 12. Social media management; 13. Geographical information; 14. Programming and mark-up languages; 15. Marketing; 16. Digital advertising; 17. Business resources; 18. Social media; 19. SEO, SEM and ASO; 20. Digital signage; 21. Teamwork; 22. Data processing; and 23. Data and information visualisation.

Regarding the accessibility, in terms of cost, of the technological tools, each of those demanded in the job postings was coded into the "paid" or "free of charge" categories if the tools were proprietary, or into the "free and open-source software" (FOSS) category.

The coding protocol was applied to each of the 433 job postings included in the sample, which constitutes the unit of analysis of this study. In accordance with these criteria, an inter-coder reliability test was performed on 10% of the sample (n=43), which resulted in a statistically optimal mean Scott's pi value of 0.82 for the considered variables.

5. Results

5.1. *Characteristics of the Spanish labour market available in job portals to journalism graduates*

Of the 433 job postings analysed, only 13.2% (n=57) were for jobs in media outlets and 22.9% in communication agencies (n=99), whereas 57.5% (n=249) were for jobs in firms outside the communication sector and 6.5% (n=28) in various institutions/associations/NGOs. These results are consistent with earlier studies (Palomo & Palau Sampio, 2016), which found that less than a third of job postings for journalists or editors on Infojobs between August and October 2015 came from media outlets. Media outlets may use other recruitment channels (their own websites, internships, etc.).

The chance for firms to publish their own content without depending on other media drives their interest in professionals specialising in content creation to improve their image, build relationships with clients, legitimate their interests and increase their sales (Koch *et al.*, 2020; Serazio, 2021), resorting to public relations, marketing and journalism practices (Yarnykh, 2019).

Meanwhile, 30.5% (n=132) of the job postings analysed were aimed exclusively at Journalism graduates, and 69.5% (n=301) at graduates in Journalism or other disciplines, mainly Advertising and Public Relations (47.1%, n=204), Marketing (37.4%, n=162) and Audiovisual Communication (15.0%, n=65). These data show that Journalism graduates are competing against other graduates for jobs in a market where various types of communication converge.

Regarding the professional areas into which the job postings fall, 43.6% (n=189) of the jobs had functions or tasks particular to advertising and marketing; 38.8% (n=168) to corporate communication; and just 17.6% (n=76) to the production of journalistic information. These results are consistent with previous studies (Marta Lazo *et al.*, 2018), which identified that the majority of job postings aimed at Journalism graduates were for jobs in the areas of marketing and advertising (47%), followed by journalism and editing (28%) and corporate communication (25%).

The jobs that employers were seeking to fill are the following: communication specialist/executive/director (21.2%, n=92), content creator/manager/editor (17.6%, n=76), marketing specialist/executive/director (17.6%, n=76), journalist (12.7%, n=55), social media manager (12.2%, n=53), copywriter (6.0%, n=26), account director (4.8%, n=21), SEO/SEM/ASO specialist

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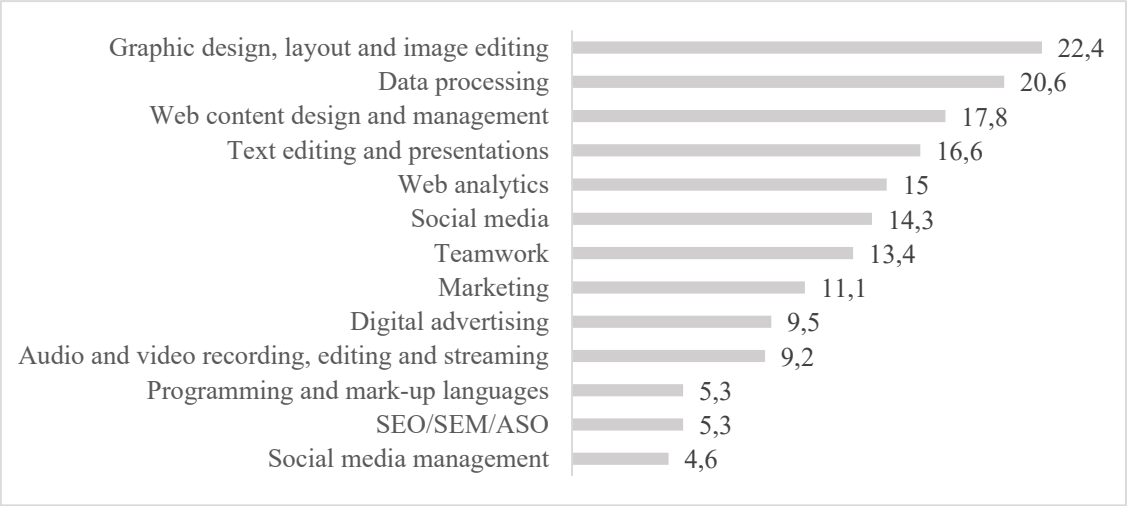
(2.8%, n=12), public relations specialist/executive/director (2.8%, n=12), data analyst (1.2%, n=5), technical writer (0.7%, n=3) and designer (0.2%, n=1).

The paucity of job postings for journalistic positions (12.7%) compared to those related to corporate communication allows contextualising the "expansion" of Journalism graduates, and even the professionals working as journalists, towards other sectors, especially corporate communication and public relations (Koch & Obermaier, 2014; Pérez Serrano *et al.*, 2015; Viererbl & Koch, 2019). And that, even in the news companies, which demand journalists for activities related to public relations, design, marketing or advertising for those companies themselves (Kustermann *et al.*, 2022).The data characterise the labour market available for Journalism graduates on the online job platforms as one that is shared with graduates in Advertising and Public Relations and in Marketing, in which the majority of job postings come from private firms for tasks connected with corporate communication or the advertising and marketing of their products and services.

5.2. *The most demanded types of technology and technological tools*

Of the 433 job postings analysed, 241 (55.7%) sought a knowledge of certain technological tools, up to a total of 161 different ones. These tools were sorted into 23 categories, which, in descending order from most to least demanded, are the following (Chart 1, for tools demanded in at least 5% of the job postings): 1. Graphic design, layout and image editing; 2. Data processing; 3. Web content design and management; 4. Text editing and presentations; 5. Web analytics; 6. Social media; 7. Teamwork; 8. Marketing; 9. Digital advertising; 10. Audio and video recording, editing and streaming; 11. Programming and mark-up languages; 12. SEO, SEM and ASO; 13. Social media management; 14. Databases (0.7%); 15. Purchasing (0.7%); 16. Business resources (0.7%); 17. Data and information visualisation (0.7%); 18. Geographical information (0.5%); 19. Aggregators (0.2%); 20. Cybersecurity (0.2%); 21. Online file transfer (0.2%); 22. News management (0.2%); and 23. Digital signage (0.2%).

Chart 1. The most demanded types of technology in job postings (% of job postings).



Source: own elaboration.

Regarding specific technological tools, a knowledge of which is demanded in the job postings, those found in at least 5% of the job postings analysed were Excel (in 19.2% of the 433 job postings), Photoshop (16.9%), WordPress (16.2%), PowerPoint (15.7%), Word (14.8%), Google Analytics (12.9%), Illustrator (12.2%), Facebook (9.9%), Outlook (9.9%), InDesign (9.5%), Instagram (9.0%), X (formerly Twitter) (8.3%), LinkedIn (7.9%), Premiere Pro (7.4%), Google Ads (6.5%), Mailchimp (6.0%), HTML (5.3%), Meta Ads (5.1%) and YouTube (5.1%). So, besides the tools

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for data processing (Excel), text editing and presentations (Word and PowerPoint) and teamwork (Outlook) in MS Office, which are highly demanded technologies according to some studies (Brumberger & Lauer, 2019), employers basically seek a knowledge of tools for web content design (WordPress); Adobe tools for graphic design (Photoshop, Illustrator, InDesign) and image editing (Premiere Pro); software for web analytics (Google Analytics); social media handling (Facebook, Instagram, X/Twitter, LinkedIn, YouTube); tools for advertising management in a digital environment (Google Ads, Meta Ads) and for marketing (Mailchimp), and even a knowledge of programming languages (HTML).

5.3. *Technologies required by professional area and job*

A knowledge of one technological tool or other is demanded in 64.0% (n=121) and 53.6% (n=90) of the jobs posted for professional functions related to the areas of advertising and marketing, and corporate communication, respectively. The "technologisation" of these areas is higher than that of journalism, for the functions of which the handling of at least one tool is demanded in 39.5% (n=30) of the job postings. The results show (Table 1) that priority is given to a knowledge of tools for graphic design, layout and image editing in jobs involving the performance of functions connected with the production of journalistic information and with advertising and marketing, whereas more technological skills relating to data processing and to text editing and presentations are sought in the area of corporate communication. However, the variations in the types of technology required by professional area are insignificant. As far as specific technological tools are concerned, the most demanded software applications are Premiere Pro (video editing), Photoshop (image editing) and WordPress (web content publishing) for jobs connected with the production of journalistic information; Excel (data processing), PowerPoint (presentations) and Word (text editing) for jobs in the area of corporate communication; and Photoshop, Excel and Google Analytics (web analytics) for those in advertising and marketing.

Table 1. The most demanded types of technology and technological tools by professional area (% of job postings related to each professional area).

Professional area	Types of technology	Technological tools
Journalistic information (n=76)	Graphic design/layout/image editing (14.5) Audio and video recording/editing (14.5) Web content design and management (10.5) Data processing (7.9) Web analytics (6.6) Social media (6.6)	Premiere Pro (9.2) Photoshop (7.9) WordPress (7.9) Excel (6.6) Google Analytics (5.3)
Corporate communication (n=168)	Data processing (24.4) Text editing and presentations (23.8) Graphic design/layout/image editing (23.8) Web content design and management (17.3) Teamwork (17.9)	Excel (23.8) PowerPoint (22.0) Word (20.8) Photoshop (16.7) Outlook (13.7)
Advertising and marketing (n=189)	Graphic design/layout/image editing (24.3) Web analytics (23.3) Data processing (22.2) Web content design and management (21.2) Social media (20.1)	Photoshop (20.6) Excel (20.1) Google Analytics (19.6) WordPress (19.6) PowerPoint (15.3)

Source: own elaboration.

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If we look at knowledge of the use of technological tools by job (Table 2), we find that those used for graphic design, layout and image editing tasks are the most required ones for two of the five most in-demand jobs in the postings analysed –marketing specialist/executive/director (35.5%) and communication specialist/executive/director (30.4%)– and are the second most frequent ones in postings for the jobs of social media manager (28.3%), content creator/manager/editor (15.8%) and journalist (12.7%). Data processing tools are demanded for the jobs of marketing specialist/executive/director (28.9%), communication specialist/executive/director (23.9%), content creator/manager/editor (19.7%) and journalist (7.3%). Web content design and management tools are required for the jobs of marketing specialist/executive/director (27.6%), social media manager (20.8%), communication specialist/executive/director (19.6%), content creator/manager/editor (14.5%) and journalist (7.3%).

However, some significant differences are observed because some of the types of technology considered are demanded for certain jobs. Thus, audio and video recording, editing and streaming tools are preferentially required for the job of journalist (in 16.4% of the job postings for that profile). Something similar happens with a knowledge of social media handling, which is the most frequently demanded tool for the job of social media manager (in 34.0% of the job postings). It can also be seen that a knowledge of different types of technology or of specific tools is seldom asked for in over a third of the job postings for the different professional profiles, so it could be inferred that Journalism graduates ought to be able to handle a variety of types of technological tool.

Table 2. The most demanded types of technology and technological tools for the five jobs with the highest number of postings (% of job postings related to each job).

Job	Types of technology	Technological tools
Communication specialist/executive/director	Graphic design/layout/image editing (30.4) Data processing (23.9) Text editing and presentations (22.8) Web content design and management (19.6) Teamwork (17.4)	Excel (23.9) Photoshop (22.8) PowerPoint (20.7) WordPress (19.6) Word (18.5) Illustrator (18.5)
Content creator/manager/editor	Data processing (19.7) Graphic design/layout/image editing (15.8) Web content design and management (14.5) Web analytics (10.5) Social media (10.5)	Excel (14.5) WordPress (11.8) Photoshop (9.2) Google Analytics (9.2) Facebook (9.2) Instagram (9.2)

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Marketing specialist/executive/director	Graphic design/layout/image editing (35.5) Web analytics (30.3) Data processing (28.9) Web content design and management (27.6) Text editing and presentations (25.0) Marketing (25.0)	Photoshop (30.3) Excel (28.9) Google Analytics (27.6) PowerPoint (25.0) Word (25.0)
Journalist	Audio and video recording/editing (16.4) Graphic design/layout/image editing (12.7) Web content design and management (7.3) Data processing (7.3) Web analytics (5.5) Text editing and presentations (5.5)	Photoshop (12.7) Premiere Pro (9.1) WordPress (7.3) Avid (5.5) Excel (5.5) InDesign (5.5) Outlook (5.5) PowerPoint (5.5) Word (5.5)
Social media manager	Social media (34.0) Graphic design/layout/image editing (28.3) Web content design and management (20) Digital advertising (19.8) Social media management (18.9) Web analytics (18.9)	Instagram (26.4) X/Twitter (22.6) Facebook (20.8) Photoshop (20.8) Illustrator (17.0) LinkedIn (17.0) Google Analytics (17.0)

Source: own elaboration.

Regarding specific technological tools, a knowledge of which is required depending on the job posted, Excel (data processing) and Photoshop (image editing) are the most demanded. Excel is among those most sought in postings for the jobs of communication specialist/executive/director (23.9%), content creator/manager/editor (14.5%) and marketing specialist/executive/director (28.9%). And Photoshop is among those most demanded for all the professional profiles considered: it is the top one for the jobs of marketing specialist/executive/director (30.3%) and journalist (12.4%), and a standout one for jobs of communication specialist/executive/director (22.8%), social media manager (20.8%) and content creator/manager/editor (9.2%). For the profile of social media manager, a knowledge of social media is obviously demanded in first place, mainly of Instagram (26.4%), X/Twitter (22.6%) and Facebook (20.8%).

5.4. *Accessibility, in terms of cost, of technological tools*

From the viewpoint of teaching, it is crucial to assess the accessibility, in terms of cost, of technological tools. Of the 161 tools requested in the job postings (Table 3), 137 (85.1%) are proprietary software; that is, software for which some licensing rights are reserved, such as the right to use, modify or redistribute. Of these, 95 (59.0% of the total tools required) are paid proprietary software, and 42 (26.1%) are freeware (that is, proprietary software made available to the user free of charge). The remaining 24 tools (14.9%) are Free and Open-Source Software (FOSS).

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Table 3. Accessibility, in terms of cost, of the demanded technological tools (n of job postings).

Type of tool	Accessibility (in terms of cost)	Tools
Aggregators	Free of charge	Reddit (1)
Web analytics	Paid	Ahrefs (12), Social Studio (3), Mention (2), Chartbeat (2), App Annie (1), Brandwatch (1), Omniture (1), Reputation XL (1)
	Free of charge	Google Analytics (56), Google Search Console (20), Google Trends (6), Google Tag Manager (5), App Store Connect (1)
Databases	Paid	MS SQL (1), SAP Business Warehouse (1)
	FOSS	MySQL (2), PostgreSQL (1)
Cybersecurity	Paid	Anomali (1), DomainTools (1), ThreatConnect (1)
	Free of charge	VirusTotal (1)
	FOSS	Hybrid Analysis (1), MISP Threat Sharing (1)
Purchasing	Free of charge	Alibaba (1), Amazon (1), Ebay (1), Google Shopping (1)
	FOSS	Woo Commerce (1)
Graphic design, layout and image editing	Paid	Photoshop (73), Illustrator (53), InDesign (41), Canva (15), Figma (4), Fireworks (2), Corel Draw (1), FreeHand MX (1), QuarkXPress (1), Publisher (1)
	FOSS	Sketch (3)
Web content design and management	Paid	Dreamweaver (3), FrameMaker (3), Shopify (3), Flash (2), Magento (2), Sitecore (2), Liferay (1), Squarespace (1)
	FOSS	WordPress (70), PrestaShop (6), OpenCMS (1)
Text editing and presentations	Paid	PowerPoint (68), Word (64), Prezi (3)
	Free of charge	Google Slides (1)
Audio and video recording, editing and streaming	Paid	Premiere Pro (32), After Effects (20), Avid (3), Final Cut Pro (2), Camtasia (1), Vegas Pro (1), Loom (1)
	FOSS	Audacity (1)
Online file transfer	FOSS	WeTransfer (1)
News management	Paid	Media Central (1)
Social media management	Paid	Hootsuite (14), Metricool (9), Later (2), Agorapulse (1), Iconosquare (1), Planoly (1), Socialbakers (1), Sprinklr Social, (1) XPro (1)
Geographical information	FOSS	AirNow (1), QGiS (1)
Programming languages	FOSS	HTML (23), CSS (10), JavaScript (6), PHP (3), Java (2), Python (2), XML (1)
Marketing	Paid	Mailchimp (26), HubSpot (10), Marketing Cloud (7), Pardot (5), Active Campaign (2), Selligent (2), Acrelia (1), Brevo (1), Campaign Monitor (1) Eloqua (1), Google Marketing Platform (1), Mailjet (1), Marketo Engage (1), Responsys Campaign Management (1)
	FOSS	Mautic (1)
Digital advertising	Free of charge	Google Ads (28), Meta Ads (22), LinkedIn Ads (6), Meta Business Suite (5), Google Ad Manager (3), Instagram Ads (5), Twitter Ads (4), Amazon Ads (1), Bing Ads (1)

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Business resources	Paid	Magistor (1), SAP Ariba (1), SAP S4HANA, (1) SAP HR (1)
Social media	Free of charge	Facebook (43), Instagram (39), Twitter (36), LinkedIn (34), YouTube (22), TikTok (12), Pinterest (3), Clubhouse (2), WhatsApp (2), *Flickr (*1), Indeed (1), TripAdvisor (1), Twitch (3), Viva Engage (1), WhatsApp Business (1)
	FOSS	Telegram (1)
SEO, SEM, ASO	Paid	Semrush (18), Screaming Frog (7), Sistrix (5), Moz (2), App Tweak (1), Lumar (1), Majestic SEO (1), ProRankTracker (1), SEOmonitor (1), SEO PowerSuite (1), SE Ranking (1), URL Profiler (1)
	Free of charge	Google Keyword Planner (4)
Digital signage	Paid	Xibo (1)
Teamwork	Paid	Outlook (43), SharePoint (4), Asana (2), Debble (2), Teams (2), Trello (2), Jira Boards (1), Planner (1), Zeplin (1), Zoom (1)
	Free of charge	Google Drive (3), Google Suite (3), Google Docs (4)
	FOSS	Jabber (1)
Data processing	Paid	Excel (83), Power BI (2)
	Free of charge	Looker Studio (5) Google Sheets (3)
Data and information visualisation	Paid	Flourish (2)
	FOSS	Datawrapper (2)

Source: own elaboration.

Given that the majority of technological tools demanded in job posting are paid, and even taking into account that some of them offer free-of-charge versions with or without time limits, though always with less functionality, it seems important to foster collaboration between firms and universities to ensure that students can have access to these technologies (Luttrell *et al.*, 2020). Furthermore, the European Union is leading the open-source software strategy (2020-2023) (European Commission, 2022), so there seems to be a clear need to foster the use of open source in universities, especially as these technologies enable students to acquire technological knowledge because their source code is available, thus allowing them to incorporate and develop updates.

6. Discussion and conclusions

In this study, the technological skills that employers demand from Journalism graduates, as well as the labour market available on online job platforms LinkedIn and Infojobs to such graduates in Spain, are analysed. Previous studies on the competencies and skills demanded from Journalism graduates have mainly focused on analysing jobs posted by media companies (Carpenter, 2009; Massey, 2010; Wenger & Owens, 2012, 2013; Wenger *et al.*, 2014; Wenger *et al.*, 2018; Young & Carson, 2018; Guo & Volz, 2019; Powers 2021). With the exception of some works (Marta Lazo *et al.*, 2018), no attention was paid to job postings on job platforms targeted at these graduates. This lack of interest may be explained by the tendency to prioritise the "ideal" conception of journalism performed in the media as the only professional opening for Journalism graduates despite that fact that such graduates are actually working in other communication sectors, and especially in the field of public relations and corporate communication (Koch & Obermaier, 2014).

The results of this study show that almost 60% of the job postings analysed ask those applying for the job to have a command of at least one specific technological tool, although a number of job postings over this percentage require candidates to be proficient in skills such

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as 'using social networks', 'performing analytical tasks' or 'running advertising campaigns on social networks', which also involve the use of technology. The analysis of the 433 job postings enabled 161 tools to be identified, which were organised into 23 categories by their functionality. The 10 most demanded tools were for graphic design, layout and image editing; data processing; web content design and management; text editing and presentations; web analytics; social media; teamwork; marketing; digital advertising; and audio and video recording, editing and streaming. The results of the research show the variety of technologies used in the field of communication and the interest that firms have in creating and positioning web content, managing data, doing analytics monitoring, being on social media and generating communications for advertising and marketing purposes.

Compared to the 64.0% and 53.6% of job postings in the areas of advertising and marketing, and corporate communication, respectively, just 39.5% of the journalistic jobs required the ability to handle at least one technological tool. It may be that the job of journalist is not as dependent on technology or that there are not as many tools focusing on journalism as there are on advertising and marketing, and corporate communication. Comparing the tools required in the analysed job postings with those used in the Journalism degree programme's teaching at Spanish universities (Sierra *et al.*, 2020; Del Olmo *et al.*, 2021), we find that journalism teaching in Spain would need to include the use of social media and a greater diversity of technologies, especially for SEO editing and web analytics.

From an academic perspective, it is important to evaluate the accessibility, in terms of cost, of the technological tools that Journalism graduates are required to have a knowledge of. Nearly 60% of the technologies whose command is needed in order to apply for the jobs in the postings analysed are paid, so addressing the problem of cost, which is one of the main barriers to introducing technologies into journalism teaching would require collaboration between firms and universities to be promoted (Luttrell *et al.*, 2020). Moreover, whilst only 14.9% of the technological tools demanded in the job postings are FOSS, it would be desirable to address students' interest in acquiring broader technological skills through the use of open-source technologies in teaching.

In conclusion, the results of this study reveal that the labour market available to Journalism graduates is shaped by a diversity of technological tools for designing websites, creating a corporate image, using social media and generating advertising, which they broadly share with graduates in Advertising and Public Relations, Marketing and other disciplines. These results are consistent with a context in which journalistic activity has begun to be linked to "branded content" too (Bull, 2013; Serazio, 2021), and where more and more Journalism graduates are working in the area of corporate communication and public relations (APM, 2020; Molyneux & Holton, 2014; Viererbl & Koch, 2019), and even doing so within media outlets themselves (Kustermann *et al.*, 2022; Young & Carson, 2016).

Meanwhile, given the existence of legitimate concerns about the media losing "their influence in shaping the development of AI" (Deuze & Beckett, 2022), a technology that some of the tools identified in the job postings use, and considering that teaching can also be a way of bringing a fresh approach to journalism (Drok, 2019), it may be of interest to ensure that university education not only provides students with the skills that the market demands, but also tries to influence the development of technologies to improve journalistic professional practice. In this regard, the document produced by UNESCO (Miao *et al.*, 2021) about the application of AI to education suggests that education providers should anticipate the technological changes, "equipping today's workers and preparing new generations with the necessary technical and social job skills, to smooth the transition to a world dominated by AI, while ensuring social sustainability."

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Future studies could replicate and extend this analysis to other countries to see if the technological tools demanded in the Spanish labour market for Journalism graduates match those demanded in other sociocultural and labour contexts. It would also be interesting to examine how the demand for technological skills in general, and for those of AI in particular, evolves over the next few years. Nevertheless, many of the technological tools present in the online job platforms analysed use artificial intelligence, and others, such as WordPress or PrestaShop, allow the integration of extensions based on this technology.

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