

The training in technology subjects of the future journalist in Spain

La formación en materias de tecnología del futuro periodista en España

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ABSTRACT

Introduction. In this empirical research we analyse the introduction of technology subjects offered by Spanish universities (public and private) through the Journalism / Communication graduate studies. **Methodology.** In the article we analyse, through the technique of content analysis, thirty-eight degree study plans out of a universe of more than one thousand nine hundred subjects. **Results.** The research discloses interesting findings, like implementations and emerging technologies are being reflected in the designs of current curricula in Spain. **Conclusions.** We also indicate which are the Spanish universities with the highest credit load and number of subjects offered in terms of technology.

KEYWORDS: technologies; Communication; digital content; study plans.

RESUMEN

Introducción. En este trabajo de investigación empírica analizamos la introducción de asignaturas en materia tecnológica que ofrecen las universidades españolas (públicas y privadas) a través de los Grados de Periodismo/Comunicación. **Metodología.** En el artículo analizamos, mediante la técnica de análisis de contenido, treinta y ocho planes de estudio de Grado a partir de un universo de más de mil novecientas asignaturas. **Resultados.** La investigación descubre hallazgos interesantes en cuanto al grado de implementación, descubriendo qué tecnologías emergentes están reflejándose en los diseños de los planes de estudio actuales en España. **Conclusiones.** Se indican cuáles son las

universidades españolas que más carga crediticia y número de asignaturas ofrecen relacionadas con la tecnología.

PALABRAS CLAVE: tecnologías; Comunicación; contenidos digitales; planes de estudio.

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Translated by **Yuhanny Henares** (Academic translator, Universitat de Barcelona).

1. Introduction. The relevance of training in Technology in the current journalism

This empirical study aims to complement the studies conducted by Sánchez-García, Campos-Domínguez and Marinho (2016) in terms of the digital training of the graduate degree study plans of Journalism, by comparing data between Spain and Portugal.

Currently, we are part of a digital ecosystem where complex interactions between culture, economy and technology are taking place in a globalised world dominated by symbols, texts, sounds and images. In this vertiginous wave of change, the grounds of innovation and productivity are being redefined, as well as the models and paradigms of the classical journalism and the shape of future jobs.

Different researches have delved into that transition from the mainstream to the digital journalism, focusing on different aspects like convergence (Salaverría and García Avilés, 2008), technological virtualisation (Fondevila, 2010) or skills and professional profiles (Meso Ayerdi, 2003; Scolari, Micó and Navarro, 2008; López García, 2010; Sierra and Cabezuelo, 2009; Marinho, 2012 and Rosique, 2013; Jiménez-Gómez and Mañas-Viniegra, 2018).

The eclosion of CIT and other emerging technologies, as well as the development of digital contents, are changing the way journalism is performed. We see how the *virtual reality* has generated what some experts call the immersive journalism, promoting the spectator to be completely introduced in the story. On the other hand, the *big data* plays a key role in the investigative journalism and artificial intelligence is becoming crucial for the automation of journalistic routines. From these innovations that impact the functions of a journalist in an editorial office, Lerma Noriega (2018, p. 1441) has echoed when stating that “the classical functions of the journalist have changed, especially in those aspects related to the multimedia skill, because new professional profiles have been conceived: designers, animators, infographers, *big data* analysts, web developers, APP developers, etc.”

In this same line, Salaverría and García Avilés (2008, p. 43) alert about how technology increases productivity, because the writer is not only demanded to write properly, but also further skills are required like video editing, layout, posting on a website, basic aspects of photography and locution fundamentals, in a close compliance with the profile of the multimedia journalist.

According to the consultant agency Gartner¹ in a report about the ten technological trends² that will govern the digital landscape next year, these will reach a worldwide boom – for at least the next

¹ Further and more complete information can be consulted in <https://gtnr.it/2yjb2d3> (retrieved 14/12/2018).

decade - in all areas of the society, some of them impacting journalism. Therefore, there is a professional and academic concern about being adapted to these new demands in the professional practice of journalism.

The Communication professional of the 21st century will not only be affected by the irruption of the new technologies, but instead the new needs of the market have already imposed a much more transversal profile, with broader scope perspectives, where the informative communication and advertising and audiovisual communication are perceived in an unitary and indissociable manner. The journalist of the future must write for different media, platforms and formats, that will demand a greater flexibility and complementary training on technological skills and abilities.

2. Necessary training in technologies for future journalists

If, as said earlier, the new technologies are causing a digital *tsunami* in the transformation of organisations - Including the journalistic agency- the Communication Faculties must offer support and response to the emergent educational needs of this new professional of the 21st century, in consonance with the needs of the labour market. The universities must accompany and, even, lead the training on new technologies, required to meet the dizzying technological progresses and the requirements of the productive sector. The European Higher Education Area (EHEA) or the Bologna Plan (European Commission, 1999) has enabled business organisations to participate in the design of study plans. This way, both business and university establish a perfect bundle that enables an adequate feedback. There would be no use in training professionals at the universities that are not being educated on the new communication needs required by companies, based on the irruption of these new technologies that influence the processes of production, editing, elaboration and publications of news. Therefore, journalists must make the most of the advantages offered by new technologies in the development of the present.

Casals (2006, pp. 65-66) considers mandatory to incorporate the CIT tools in the process of learning-teaching of journalism. This transition towards the multimedia journalism has equalled in relevance to *what* is being communicated and *how* the journalist does so. Even in this era of image and immediacy, we could ensure that the *how* will condition the way of *what* we communicate. In that same rationale Tejedor (2008, p. 25), is aware about the revolution that Internet represents in the daily development of the journalistic tasks and emphasises the need for a competitive education of future *online* communication professionals, training them to be ready and face the challenges of the new labour scenario. Verón and Sabes (2008, p. 113) point out the Faculties of Communication as leading stakeholders to assume the challenge of training future communicators about technology, in order to educate them properly to work in the labour market. Furthermore, they manifest (2008, p. 107) the need about making substantial changes in the degree study plans of Journalism so that students of these graduate programmes delve into the concepts, grounds and techniques of digital journalism:

we need to show our university students what is the digital journalism, undoubtedly, but we need to change many other things within the study plans considering the ever-changing reality in the world of communication. The objective is to achieve an adequate education and in accordance with the current situation, but also thinking about its future (Verón and Sabes, p. 107).

² Artificial Intelligence (AI), smart applications and analytics, *intelligent things*, *digital twins*, *cloud to the edge*, conversational platforms, immersive experiences, *blockchain*, *event*, continuous adaptive risk and trust.

Palomo Torres (2012, p. 681) also coincides with this shifting perspective of the world of communication, claiming the required constant renewal of the studies of Journalism to adapt its contents to the current contexts.

As a complement to the view of these researchers, there are other authors who have represented in their studies, the need to incorporate the teaching of cyberjournalism in the study plans of the Graduate Degrees of Journalism and Communication (Martínez Albertos, 1997; Meso, 2008; Barranquero and Redondo, 2009; López, 2010; Orihuela, 2011; Cobo and Juárez, 2012; Acedo, Marta and Aparicci, 2013; Sánchez García and Campos, 2016). All these, manifest the need to educate future journalists on technologies. Some of them, even sharing the need to train in technologies, highlight the fact of keeping an eye on the essential values of the profession: search for truth, verification of sources, informative independence, control of power, news selection, analysis of facts, contrast of sources, monitoring of deontological principles, etc. The design of the new study plans will, therefore, entail the challenge of searching for the balance between training in technologies and the education on the grounds that have traditionally constituted the journalistic profession. The educative situation of EHEA enables, to a great extent, that flexibility for update and permanent adaptation (Sierra, 2010a, pp. 156-157).

3. Object, hypothesis and objective of the research

The object of this study is to understand how the training on new technologies is implemented in the graduate study plans of Journalism and Communication at Spanish Universities. We have suggested the following initial hypotheses:

H1. There is a low credit load in terms of technologies in the Spanish graduate study plans of Journalism/ Communication.

H2. The emergent technologies that have been accommodated the most in the study plans of Journalism are related to the big data management and processing (*big data* journalism).

H3. The technological *softwares* to train on technological skills are mainly licensed (paid commercial licenses).

The general objective is to make an X-ray picture, an overview of how the Faculties of Communications Sciences in Spain have inserted the training in Technology inside the new design of the study plans after the *Royal Decree 1393/2007, dated 29 October, took effect. A Decree that sets forth the planning of official university degrees* and the subsequent update of the Royal Decree 861/2010, dated 2 July. A series of specific objectives result from this general objective:

1. Discover what technologies are being used by students of the degree studies of Journalism/ Communication at Spanish Universities.
 - 1.1. Delve into the modality (optional/ compulsory) under which the subjects related to technology are being introduced in the study plan.
2. Analyse what are the *softwares* used to understand the bases of the different technologies studied.
 - 2.1. To discover what are the computer programmes used for video edition and audiovisual post-production; edition of static images and illustration; sound edition and post-production; creation of APP and use tracking; 3D; creation of websites and analytics.
3. To study what are the digital contents analysed during the degree studies of Journalism/ Communication.

4. To investigate what are the universities offering the greatest number of subjects related to technology (contained in the study plans of Journalism/ Communication).

4. Research methodology

This work is based in a qualitative research approach (Rodríguez, Gil and García, 1996), using the documents analysis technique³. The potential findings of the teaching guidelines of the subjects included in each one of the study plans were located based on investigation procedures from the contents analysis (Berelson, 1952; Martín López, 1963; Krippendorff, 1990). Based on this methodology, a category system was established that consisted of classifying the information contained in the normative documents using previously defined criteria.

Table 1. *Category system of analysis of the technology subjects included in the degree studies of Journalism/ Communication in Spain.*

Dimension	Analysis item
Design of study plans in Journalism/ Communication	<ul style="list-style-type: none"> • Number of credits destined to training in technology • Optional and compulsory modality • Number of subjects training technological skills
Technology	<ul style="list-style-type: none"> • Technologies studied • Digital contents managed
Softwares offering support to technological education	<ul style="list-style-type: none"> • Edition of static images and illustration • Video edition and post-production • Audio edition and sound post-production • Creation of <i>apps</i> and use tracking. • 3D • Website creation and subsequent analytics • Statistics

Source: authors own creation.

To elaborate the analysis, the following aspects were established:

- a) Time period: November 2018.
- b) Sample: all Universities (38) offering the degree studies of Journalism/ Communication among their academic offer⁴. In total, 38 degrees were analysed.
- c) Geographical scope: Spain.
- d) Analysis units: type of technologies, type of digital contents, *softwares* used to consolidate knowledge in technology, as well as the number of subjects and credits that encompass the training on new technologies.

Once these variables were established, the contents of the teaching guidelines of 1912 subjects of all study plans⁵ of Journalism/ Communication were analysed.

³ All the teaching guidelines of Spanish Universities with degree studies on Journalism or Communication, except *Universidad Europea de Madrid* and IE University, which do not have said guidelines published openly on their websites.

⁴ In this analysis, we have excluded the Affiliated University Centres, considering that information object of analysis could be obtained from the reference university to which the Centre is affiliated to.

⁵ Explanatory note: in all analysis conducted in each one of the degrees it has been established that the subjects of Final Thesis to obtain the graduate degree and external internships are not connected to the teaching on new technologies.

Table 2. Degree studies and universities taking part in the study.

University	Type	Denomination	University	Type	Denomination
<i>Universidad de Navarra</i>	Private	Journalism	<i>Universidad de Vic</i>	Public	Journalism
<i>Universidad Francisco de Vitoria</i>	Private	Journalism	<i>Universidad de Málaga</i>	Public	Journalism
<i>Universidad Europea del Atlántico</i>	Private	Journalism	<i>Universidad de Castilla- La Mancha</i>	Public	Journalism
<i>Universidad Camilo José Cela</i>	Private	Communication	<i>Universidad Carlos III de Madrid</i>	Public	Journalism
<i>UDIMA</i>	Private	Journalism	<i>Universitat Autònoma de Barcelona</i>	Public	Journalism
<i>Universidad Pontificia de Salamanca</i>	Private	Journalism	<i>Universidad Miguel Hernández</i>	Public	Journalism
<i>Universidad de Deusto</i>	Private	Communication	<i>Universidade de Santiago de Compostela</i>	Public	Journalism
<i>Universitat Abat Oliba CEU</i>	Private	Journalism	<i>Universitat Jaume I</i>	Public	Journalism
<i>Universidad San Jorge</i>	Private	Journalism	<i>Universitat Oberta de Catalunya (UOC)</i>	Public	Communication
<i>Universidad Antonio de Nebrija</i>	Private	Journalism	<i>Universidad de Sevilla</i>	Public	Journalism
<i>UNIR</i>	Private	Communication	<i>Universidad del País Vasco</i>	Public	Journalism
<i>Universidad Europea Miguel de Cervantes</i>	Private	Journalism	<i>Universidad de La Laguna</i>	Public	Journalism
<i>Universitat Pompeu Fabra</i>	Private	Journalism	<i>Universitat Rovira i Virgili</i>	Public	Journalism
<i>Universitat Ramón Llull</i>	Private	Journalism and corporate communication	<i>Universidad de Valladolid</i>	Public	Journalism
<i>Universidad Católica de Murcia</i>	Private	Journalism	<i>Universidad Complutense de Madrid</i>	Public	Journalism
<i>Universitat Internacional de Cataluña</i>	Private	Journalism	<i>Universidad Rey Juan Carlos</i>	Public	Journalism
<i>Universidad San Pablo CEU</i>	Private	Journalism	<i>Universidad de Murcia</i>	Public	Journalism
<i>Universidad Cardenal Herrera CEU</i>	Private	Journalism	<i>Universidad de Zaragoza</i>	Public	Journalism
<i>Universidad Pontificia Comillas</i>	Private	Communication International	<i>Universitat de Valencia</i>	Public	Journalism

Source: authors own creation.

5. Research results: description and analysis

5.1. Results on implementation of credits within the study plans of Journalism/ Communication

From the 38 universities and graduate degree studies analysed, there were studied the curricular contents of 1912 teaching guidelines⁶, of which 370⁷ (19.3%) are related to the education in new technologies either directly or indirectly.

Let's analyse the data globally so to stablish, later, a comparison between public and private universities, as well as the character/ modality through which the technological contents are taught.

Table 3. Global results of subjects related to technologies studied in the degree studies of Journalism/ Communication at Spanish Universities.

University	Number of subjects	Relevance in Credits	CO (compulsory)	OP (optional)	Ownership
<i>Universidad de Navarra</i>	23	123	39	84	Private
<i>Universidad de Vic</i>	14	60	54	6	Public
<i>Universidad de Málaga</i>	14	84	48	36	Public
<i>Universidad de Castilla-La Mancha</i>	14	84	54	30	Public
<i>Universidad Francisco de Vitoria</i>	13	60	45	15	Private
<i>Universidad Carlos III de Madrid</i>	13	75	57	18	Public
<i>Universitat Autònoma de Barcelona</i>	12	72	72	0	Public
<i>Universidad Camilo José Cela</i>	12	72	48	24	Private
<i>UDIMA</i>	11	66	54	12	Private
<i>Universidad Pontificia de Salamanca</i>	11	66	66	0	Private
<i>Universidad de Deusto</i>	11	66	66	0	Private
<i>Universidad Miguel Hernández</i>	11	66	66	0	Public
<i>Universitat Abat Oliba CEU</i>	11	63	63	0	Private
<i>Universidad San Jorge</i>	11	66	48	18	Private
<i>Universidad Antonio de Nebrija</i>	10	60	60	0	Private
<i>Universidade de Santiago de Compostela</i>	10	60	60	0	Public
<i>UNIR</i>	10	40	36	4	Private
<i>Universidad Europea Miguel de Cervantes</i>	9	54	42	12	Private
<i>Universitat Jaume I</i>	9	54	48	6	Public
<i>Universitat Pompeu Fabra</i>	9	44	8	36	Private
<i>Universitat Oberta de Catalunya (UOC)</i>	9	54	36	18	Public

⁶ It is extremely noteworthy how there are subjects where, with denominations apparently unrelated to technology, the professor has decided to grant a technological view to its content. However, in other subjects on which, considering their denomination, a direct relation to technology could have been guessed, the professor has managed the contents instead from rather theoretical approaches and distanced from the technological grounds required *a priori*

⁷ It is possible that this number can increase in the academic year 19/20 given that, the *Universidad Europea del Atlántico* is currently undergoing the third year of implementation of the degree studies of Journalism.

Universidad de Sevilla	9	54	36	18	Public
Universidad del País Vasco	9	54	54	0	Public
Universitat Ramon Llull	9	32	29	3	Private
Universidad de La Laguna	8	48	36	12	Public
Universitat Rovira i Virgili	8	57	39	18	Public
Universidad de Valladolid	8	48	36	12	Public
Universidad Complutense de Madrid	8	48	30	18	Public
Universidad Rey Juan Carlos	8	48	42	6	Public
Universidad de Murcia	8	54	36	18	Public
Universidad Católica de Murcia	8	48	48	0	Private
Universitat Internacional de Cataluña	7	29	26	3	Private
Universidad de Zaragoza	6	39	27	12	Public
Universitat de Valencia	6	33	24	9	Public
Universidad San Pablo CEU	6	36	36	0	Private
Universidad Cardenal Herrera CEU	6	36	36	0	Private
Universidad Europea del Atlántico	6	36	36	0	Private
Universidad Pontificia de Comillas	3	15	15	0	Private
TOTAL	370	2104 ECTS	1656 ECTS	448 ECTS	

Source: authors own creation.

From the 2104 ECTS where there is teaching of contents related to new technologies, 78.7% of credits are taught as compulsory subjects while the remaining 22% corresponds to optional credits, depending on the specialisation of the itinerary chosen by the student. If there was an average of the number of subjects related to new technologies taught in the degree studies of Journalism/ Communication in Spain, it would be positioned in about 10 subjects. Considering the results obtained, we can confirm H1, since the offer of subjects of technological nature seems insufficient and scarce within the study plans of Journalism/ Communication.

Let's analyse the following comparative table between the education on technologies in the degree studies of Journalism/ Communication depending on the ownership of the University.

Table 4. Comparison about education in Technology in the degree studies of Journalism/ Communication by ownership.

Type of University	Number of subjects	Relevance in credits	Compulsory subjects	Optional subjects
Public Universities	184	1092	855	237
Private Universities	186	1012	801	211
TOTAL	370	2104 ECTS	1656 ECTS	448 ECTS

Source: authors own creation.

In both cases a great equality is observed in terms of the number of subjects, even in the number of credits they represent, as well as the proportionality in the number of credits between compulsory

and optional subjects, considering that *Universidad Europea del Atlántico*, of private ownership, still needs to implement the fourth year of the Degree Studies. Therefore, we can say there are hardly any significant differences in the global estimation when it comes to establishing the strategy of incorporating the education in new technologies. The five universities that offer a greater number of subjects related to new technologies would be, following an order of precedence, *Universidad de Navarra* (23), *Universidad de Vic* (14), *Universidad de Málaga* (14), *Universidad de Castilla-La Mancha* (14) and *Universidad Francisco de Vitoria* (13) and *Universidad Carlos III de Madrid* (13), both positioned in the fifth place. However, if we established that *ranking* by the relevance in credits, the aforementioned positions would change and the result would be: *Universidad de Navarra* (120 ECTS), *Universidad de Málaga* (84 ECTS), *Universidad de Castilla-La Mancha* (84 ECTS), *Universidad Carlos III* (75 ECTS) and the *Universitat Autònoma de Barcelona*, positioned in the same place together with *Universidad Camilo José Cela* (72 ECTS).

5.2. Results referred to the emerging technologies analysed in the study plans and *softwares* used to acquire and train technological skills

Let's see what are the emerging technologies being managed the most on subjects considering the analysis of the information published in the contents section of the teaching guidelines.

Table 5. *Emerging technologies analysed in the Degree Studies of Journalism/ Communication at Spanish Universities.*

Emerging technologies analysed.	Number of subjects	Percentage based on the 370 subjects related to technology
<i>Big data</i> and data Journalism	25	6.75%
Photography and Video 360°	6	1.62%
<i>Cloud computing</i>	5	1.35%
Augmented Reality	4	1.08%
Virtual Reality	4	1.08%
Internet of things	3	0.81%
Artificial Intelligence	3	0.81%
Connected television	2	0.54%

Source: authors own creation.

On table V we observe how the percentages are really low. Very slowly, the Degree studies of Journalism/ Communication are incorporating emerging technologies that represent a trend for the next years and are occupying several sectors of the current society; and, as it could not have been otherwise, are also applicable to the sector of information. In this sense, we can highlight how the Journalism of data (*big data*) is the one establishing a stronger foothold. In this occasion again, H2 is confirmed, considering it is the *big data*, within emerging technologies, the one with the highest penetration of study plans considering the data shown.

Then, the *softwares* used are analysed to understand the grounds of the different technologies studied (emerging) and most traditional audiovisuals.

Table 6. *Softwares used for the learning of video edition and post-production.*

Softwares related to video edition and post-production	Number of subjects using the software
Avid	31
Adobe Premiere	24
Adobe After Effects	10
Final Cut	5
Cinema 4D	2
Sony Vegas	1
Pinacle Studio	1
Cine Larra	1
Trakax	1
Mistika	1
HyperEngine-AV	1

Source: authors own creation.

We can observe how the *softwares* of reference for the learning of video editing and post-production are AVID and the Adobe solutions: Premiere, mainly for video edition and After Effects, for post-production. Both *softwares* require payment, but offer educational licenses. Both Avid and Adobe are standards in the audiovisual industry for these tasks. We can also observe how Universities opt for offering students free or open source *softwares*, like the computer programmes Cinelerra⁸, Trakax⁹ or HyperEngine-AV¹⁰.

Let's see the following table to identify what are the programmes used to learn to edit and illustrate images.

Table 7. *Softwares related to static images edition and illustration.*

Softwares related to static images edition and illustration	Number of subjects using that software
Adobe Photoshop	66
Adobe Indesign	58
Adobe Illustrator	31
Adobe Flash	6
QuarkXPress	4
GIMP	3
Inkscape	3
Adobe Bridge	2
Camera RAW	1
Adobe Lightroom	1
Adobe Experience Design	1

Source: authors own creation.

⁸ It is a free software for video edition under the GNU/ Linux operating system.

⁹ TrakAx PC edits audio and video to enhance sound, cuts and production.

¹⁰ *Software* of multimedia authorship to capture, edit, organise, process and export video, audio, text and create movies with DVD quality and slides presentations.

In this field, the Adobe solutions (Photoshop, Indesign, Illustrator, Lightroom Experience Design and Camera Raw) are the most extended in the professional market of journalistic, advertising and audiovisual Communication and the University is a true reflection of that. QuarkXpress, which was widely used in the nineties, today has become obsolete compared to the performance of competitor *softwares*. On the other hand, on the table there appear two open source and *freesolutions*: Inkscape¹¹ and GIMP¹².

Regarding the audio edition and post-production, it is observed that Audacity is the most extended *software* in the learning context, which is a complimentary solution of free *software*; followed by three *softwares* of reference of the professional market. At this point, it is observed that the subjects referring to the management of sound capturing, editing, reproduction and post-production are scarce. It would be interesting that the responsables for the design of the study plans of Journalism/ Communication could consider incorporating more subjects reinforcing the language and the sound technique, since they are paramount in the creation of messages.

Table 8. *Softwares related to audio, app creation and 3D.*

<i>Softwares</i> related to audio edition and sound post-production	Number of subjects using that <i>software</i>
Audacity	12
Adobe Audition	2
Pro Tools	2
Logic Audio	1
<i>Softwares</i> related to the creation of <i>apps</i> and use tracking	Number of subjects using that <i>software</i>
App Annie	1
App Inventor	1
Google App Maker	1
<i>Softwares</i> related to 3D	Number of subjects
Sketch up	2
3ds Studio Max	1
Visual SFM	1

Source: authors own creation.

Regarding the creation of *apps*, only some universities, like Navarra with the subject *Entertainment Apps Development* and Camilo José Cela with the subject *Apps and Communication*, have deemed this niche as a section that is required to be explored as a route for future employability of their graduates.

Thus, it can be confirmed how, in a natural manner, Journalism supports on subjects originally typical from Audiovisual Communication to consolidate its technological knowledges in favour of a more versatile and multimedia-oriented communication professional. To analyse the three-dimensional nature of reality, there is a scarce introduction of this education in the study plans of

¹¹ Inkscape is a free and open source editor of vector graphics. Inkscape can create and edit diagrams, lines, graphics, logos and complex illustrations.

¹² GIMP is an edition programme of digital images in the form of *bitmaps*, including drawings and pictures. It is a free and complimentary. It is part of the GNU project and it is available under the GNU Lesser General Public License.

Journalism. Only four subjects out of the 370 analysed consider the relevance of the 3D technology in the education in Journalism of the 21st century.

Table 9. *Softwares related to statistics.*

<i>Softwares</i> related to statistics	Number of subjects using them	Percentage over the 370 subjects related to technology
SPSS	23	6.21%
Excel	11	2.97%
R	2	0.54%

Source: authors own creation.

It was mentioned earlier in the introduction that the *big data*, through the data Journalism, was crucial for the interpretation that the journalist can and must do of specific data that governments and institutions make available for users through the *open data*. The knowledge of statistics is essential to better understand the depth of *big data* and its application through the data journalism; both the analysis of data as well as its visualisation. It is observed that this sort of *software* is also used in the subject of *Methods and Research Techniques in Communication*, that represents the prelude to the subject of Final Thesis of Degree studies.

In the introductory section of this study there was also evident the incidence of specific researchers about the need to update study plans of Journalism and adapt them to the requirements and needs of cyberjournalism. Therefore, in the following table there can be observed, the endeavours of the different Universities to incorporate in the study plans, subjects related to the creation of content on Internet.

Table 10. *Softwares related to contents creation and web analytics.*

Typology	<i>Software</i> related to creation and web analytics	Number of subjects using that <i>software/</i> language
Contents Manager	CMS (Wordpress)	31
	CMS (WIX)	3
	CMS (Joomla)	3
	CMS (Drupal)	2
	CMS (Bluegriffon)	2
	Adobe Dreamweaver	3
	Omeka ¹³	1
Programming	HTML	18
	CSS	5
	XML	3
	Javascript	2
	C++	2
	Processing	1

¹³ Omeka is a free, flexible and open source software conceived for the publication of digital collections of libraries, archives, museums or any other institution willing to disseminate their cultural patrimony on the Internet.

Databases	MySQL	2
Web analytics	Google Analytics	14
	Google Adwords	2
	Google Rank	1
	Google Trends	1
	Ommiture	1
Webmaster tools	Google Search Console	1
Files transference	FTP	3

Source: authors own creation.

Considering the visualisation of Table X, several conclusions might be obtained:

- There is a greater number of subjects that put a special emphasis in the learning of contents creation on Internet.
- Among the CMS (*Content Management System*), Wordpress is the most extended at educational level.
- Among the programming languages, there is usually work under a HTML environment (*HyperText Markup Language*).
- Lastly, for anything regarding web analytics, the free solutions offered by Google are positioned as the most widely used, as it could not have been otherwise, because, according to the Statcounter data of December 2018, Google is the leader search engine with 92.9% of the market share worldwide.

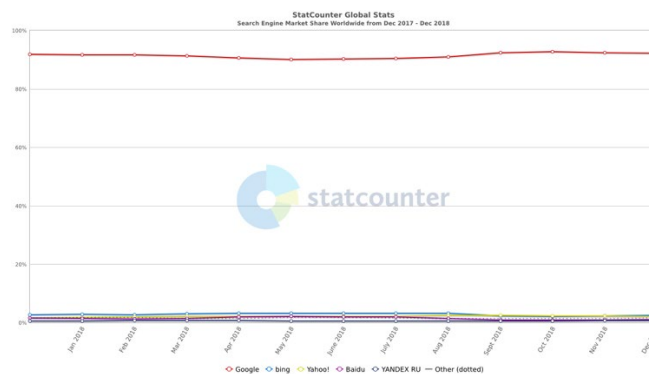


Figure 1: Search engine market share worldwide¹⁴.

Source: Statcounter (2018).

5.3. Results referred to the digital contents managed in the study plans of Journalism/ Communication

To finalise this last section of results and considering one of the objectives set forth from the start, we show below the results obtained about the most managed digital contents in the study plans.

¹⁴ Retrieved from <http://gs.statcounter.com/search-engine-market-share> (Reviewed on 10/12/2018)

Table 11. *Digital contents managed in the technological subjects in the study plans of Journalism/ Communication.*

Digital contents managed	Types	Number of subjects	Percentage over the 370 subjects related to technology
Videogames		9	2.43%
Social Networks	Total Networks	42	11.35%
	YouTube	7	
	LinkedIn	4	
	Instagram	4	
	Twitter	6	
	Storify	1	
	Google +	1	
	Vimeo	1	
	Snapchat	1	
	WhatsApp	1	
	Telegram	1	
	Flickr	1	
	Socialcam	1	
App		6	1.62%
Digital television (TDT)		27	7.29%
Digital Radio		40	10.81%
Digital journalism		24	6.48%

Source: authors own creation.

Therefore, the social networks are of special relevance in the design of study plans. It is observed how the most treated theme are social networks (11.35%), followed by digital radio (10.81%), TDT (7.29%) and Digital Journalism (6.48%).

6. Conclusions

Based on the data obtained, it is possible to generate some conclusions about how the contents related to technologies are being implemented in the degree studies of Journalism/ Communication in Spanish Universities:

1. The subjects associated with technologies are essentially introduced under the compulsory modality as part of the study plan.
2. The public and private universities that offer Journalism have opted for a very similar strategy when it comes to introduce technological subjects in the study plans. The global average in Spain positions in about 10 technological subjects in the study plans.
3. The proprietary *software* programmes are mainly the ones complementing the technological education of the future journalist. In this sense, the following commercial licenses to train each one of the technological skills stand out: AVID and the Adobe package for edition and post-production of static and dynamic images. For the study of three-dimensional effect,

SkeethUp and Autodesk 3Ds Studio Max are a standard in both education and the labour market. The solution offered by IBM (SPSS) is the most extended in the university studies to understand the statistical treatment of data. Only the Audacity, which is an application for audio edition and post-production, is the most extended free *software* solution in the education on journalism. These data allow to positively confirm hypothesis H3.

4. The digital contents that grab the focus of education and attention in terms of the design of study plans are essentially the social networks, because they have turned into a fundamental medium for spreading information, as well as a means of consumption and distribution of informational products.

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