

# Comunicar

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**Shared Science and Knowledge**  
Open Access, Technology and Education

Ciencia abierta y saber compartido. Acceso abierto, tecnologías y educación



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## INDEXED INTERNATIONAL SCIENTIFIC JOURNAL

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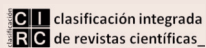
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# CONTENTS

Comunicar, 54, XXVI (2018-1)

## Shared science and knowledge Open access, technology and education

Ciencia y saber compartidos  
Acceso abierto, tecnologías y educación



### DOSSIER

#### THEMATIC EDITORS

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- |  |              |
|--|--------------|
| <b>01. Co-creation and open innovation: Systematic literature review</b> .....   | <b>09-18</b> |
| Co-creación e innovación abierta: Revisión sistemática de literatura   |              |
| <i>María-Soledad Ramírez and Francisco-José García-Peñalvo. Monterrey (Mexico) and Salamanca (Spain)</i>                   |              |
| <b>02. Assessing the ethical and content quality of online parenting resources</b> .....                                   | <b>19-27</b> |
| Evaluación de la calidad ética y del contenido de los recursos online para padres  |              |
| <i>Arminda Suárez-Perdomo, Sonia Byrne and María-José Rodrigo. Tenerife (Spain)</i>  |              |
| <b>03. Participatory design of citizen science experiments</b> .....   | <b>29-38</b> |
| Diseño participativo de experimentos de ciencia ciudadana  |              |
| <i>Enric Senabre, Núria Ferran-Ferrer and Josep Perelló. Barcelona (Spain)</i>   |              |
| <b>04. Wikipedia in higher education: Changes in perceived value through content contribution</b> .....                    | <b>39-48</b> |
| Wikipedia en la Universidad: cambios en la percepción de valor con la creación de contenidos                               |              |
| <i>Joan Soler-Adillon, Dragana Pavlovic and Pere Freixa. Londres (RUnited Kingdom), Niš (Serbia) and Barcelona (Spain)</i> |              |
| <b>05. Ubiquitous learning ecologies for a critical cyber-citizenship</b> .....  | <b>49-58</b> |
| Ecologías de aprendizaje ubicuo para la ciberciudadanía crítica  |              |
| <i>Enrique Díez-Gutiérrez and José-María Díaz-Nafriá. León (Spain) and Múnich (Germany)</i>                                |              |

#### KALEIDOSCOPE

- |  |                |
|--|----------------|
| <b>06. Teen videos on YouTube: Features and digital vulnerabilities</b> .....                                      | <b>61-69</b>   |
| Los vídeos de los adolescentes en YouTube: Características y vulnerabilidades digitales                            |                |
| <i>Manuel Montes-Vozmediano, Antonio García-Jiménez and Juan Menor-Sendra. Madrid (Spain)</i>                      |                |
| <b>07. Parental mediation of the Internet use of Primary students: Beliefs, strategies and difficulties</b> .....  | <b>71-79</b>   |
| Mediación parental del uso de Internet en el alumnado de Primaria: creencias, estrategias y dificultades           |                |
| <i>Isabel Bartau-Rojas, Ana Aierbe-Barandiaran and Eider Oregui-González. San Sebastián (Spain)</i>                |                |
| <b>08. Perceptions and participation in community radio stations in Nariño-Colombia</b> .....                      | <b>81-90</b>   |
| Percepciones y participación en emisoras de radio comunitaria en Nariño-Colombia                                   |                |
| <i>Omar-Gerardo Martínez-Roa and Elsy-Genith Ortega-Erazo. Pasto (Colombia)</i>                                    |                |
| <b>09. Strategies for the communication and collaborative online work by university students</b> .....             | <b>91-99</b>   |
| Estrategias para la comunicación y el trabajo colaborativo en red de los estudiantes universitarios                |                |
| <i>Isabel Gutiérrez-Porlán, Marimar Román-García and María-del-Mar Sánchez-Vera. Universidad de Murcia (Spain)</i> |                |
| <b>10. Critical thinking of young citizens towards news headlines in Chile</b> .....                               | <b>101-110</b> |
| Pensamiento crítico de los jóvenes ciudadanos frente a las noticias en Chile                                       |                |
| <i>Matthieu Vernier, Luis Cárcamo and Eliana Scheihing. Valdivia (Chile)</i>                                       |                |

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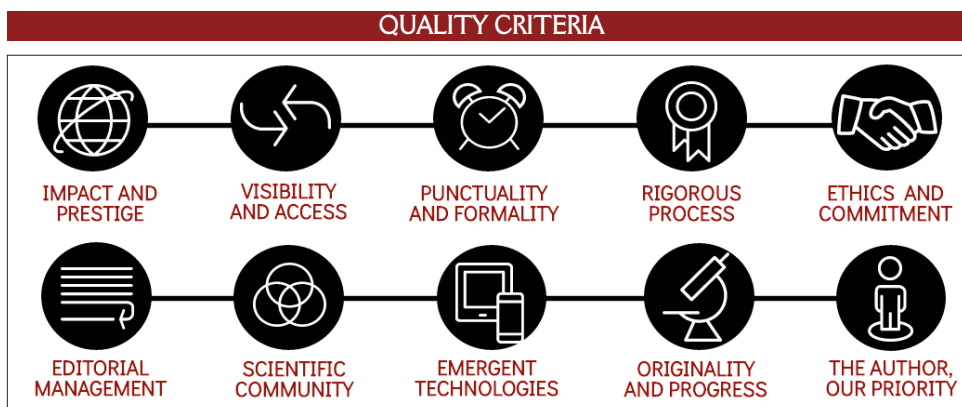
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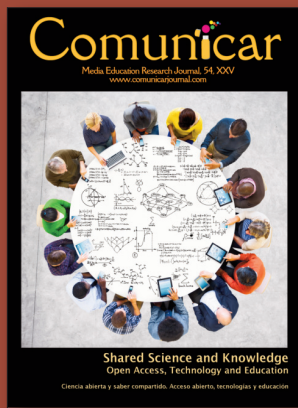
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- Percent of manuscripts accepted: 4,9%; Percent of manuscript rejected: 95,1%.
- Received manuscripts internationalisation: 33 countries.
- Numbers of Reviews: 144 (update: [www.comunicarjournal.com](http://www.comunicarjournal.com)).
- Scientific Reviewers internationalisation: 11 countries.
- Country of origin: 7 countries (Chile, Colombia, Germany, Mexico, United Kingdom, Serbia, and Spain).
- International databases in COMUNICAR 54: 618 (2017-12-01) (update: [www.comunicarjournal.com](http://www.comunicarjournal.com)).



Comunicar 54

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# Co-creation and open innovation: Systematic literature review

## Co-creación e innovación abierta: Revisión sistemática de literatura

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### ABSTRACT

Open science, as a common good, opens possibilities for the development of nations, through innovations and collaborative constructions, which help to democratize knowledge. Advances in this area are still emerging, and the open science, co-creation of knowledge and open innovation triangle, is presented as an opportunity to generate an original contribution from research to open educational theory and practices. The study analyzed the articles that addressed this triangle, in order to identify the contexts and challenges that arise in open innovation and the co-creation of knowledge to promote open science. The method was a systematic literature review (SLR) of 168 articles published in open access format, from January 2014 to May 2017 in the Web of Science and Scopus databases. In the validation process, the York University criteria were used: inclusion and exclusion, relevance of the pertinent studies, evaluation of the quality / validity of included studies and description of data / basic studies. The findings showed that the most-widely publicized contexts were in the United States and Brazil, in the business and academic sectors (closely followed by the social sector), and the challenges were open to innovation, opening and research. The research concludes that the context and practices of collaboration are substantial elements for innovation and open science.

### RESUMEN

La ciencia abierta, como bien común, abre posibilidades para el desarrollo de las naciones a través de innovaciones y construcciones colaborativas que ayudan a democratizar el conocimiento. Los avances en la materia aún son incipientes y el triángulo ciencia abierta, co-creación del conocimiento e innovación abierta se presenta como una oportunidad de generar un aporte original, desde la investigación, para la teoría y las prácticas educativas abiertas. En el estudio se analizaron los artículos que abordan este triángulo, con el fin de identificar los contextos y retos que se presentan en la innovación y en la co-creación de conocimiento para impulsar la ciencia abierta. El método fue una revisión sistemática de literatura (SLR) de 168 artículos publicados en acceso abierto, de enero 2014 a mayo 2017, en las bases de datos Web of Science y Scopus. La validación se dio con los criterios de la Universidad de York: inclusión y exclusión, pertinencia, evaluación de calidad / validez de los estudios y descripción de datos. Los hallazgos reflejan que los contextos de mayor publicación sobre el tema son los de Estados Unidos y Brasil, en los sectores empresariales y académicos (seguido de cerca por el sector social) y los retos se abren en las posibilidades de innovación, apertura e investigación. Se concluye que el contexto y las prácticas de colaboración son elementos sustanciales para la innovación y la ciencia abierta.

### KEYWORDS | PALABRAS CLAVE

Open science, citizen science, knowledge, collaboration, openness, innovation, knowledge co-creation, validation.  
Ciencia abierta, ciencia ciudadana, conocimiento, colaboración, apertura, innovación, co-creación de conocimiento, validación.



## 1. Introduction and state of the art

The democratization of knowledge, as a common good, has been driven by open science. Álvarez and Sintas (2012) have posited that the paradigm of open science is re-enforced with the commitment for e-Science that implies the collaborative use of resources that are geographically distributed but interconnected through the Internet. Other areas of open and collaborative science are found in what is named “crowd science”, “citizen science”, or “network-connected science”. Franzoni and Sauermann (2014) have mentioned two important characteristics: participation in a project is open to a wide base of potential contributors, and the intermediate consumables, such as data or problem-solution algorithms, are openly available. An important part of open science is comprised, without a doubt, by ethical processes to maintain high standards of integrity and consciousness, where the sharing and communication of knowledge requires that it be worked upon starting with a training course for scientists that integrates ethics in the sciences, training in history and the philosophy of science and their cultural impact (UNESCO, 2004). In these ethical guidelines, the participation, the collaboration and the public policy are of great help for endorsing this training and the practices needed to make knowledge accessible to everyone.

The support for open science is differentiated according to the contexts and the policies of the research and development councils. García-Aristegui and Rendueles (2014) have mentioned that the criticism of the monopolist power can be explained from at least two very different political perspectives (liberal or institutionalist), with divergent consequences in the conception of the organization, financing and the scientific research programs. Lasthiotakis, Kretz, and Sá (2015) have identified approaches utilized by Canada, the U.S. and the United Kingdom to push forward open science, as a step towards the understanding of how politics and policy in this sphere are evolving. Along the same lines, the drive towards open access has been gradual in India, although it still lacks the support of national bodies that could provide a greater push and sustainability (National Knowledge Commission, 2007). Likewise, Mulder (2013) makes allusions that many other countries (for example, Brazil, China, Indonesia, Japan, Korea, Poland, South Africa, Turkey, United Kingdom, Vietnam) have introduced specific measures or subsidies. This is in contrast with the Latin American sphere, where the policies of support for open science are very recent in some countries (Argentina, Peru, Mexico) and there is still a lack of extension in the countries in the region (Betancourt, Celaya, & Ramírez-Montoya, 2014; Ramírez-Montoya, 2015). The drive for open science brings with it practices of innovation that can greatly affect the development of many countries, especially if the myths that for diverse motives have been associated with the movement of open knowledge are eradicated.

Speaking about open science implies relating it to the capacities of openness and linkage. Dahlander and Gann (2010) systemically worked on the term “open innovation” with the aim of clarifying the definition of “openness”, such as used in “open innovation”, and the research indicated that open innovation in the educational process would imply the visualization of internal factors or openness (institutional processes and strategies) and internal ones as well (link to the exterior). Other authors (García-Peñalvo, García-de-Figuerola, & Merlo-Vega, 2010; Lichtenhaler, 2011; Olalla, Sandulli, Menéndez, & Duarte, 2014; Rodríguez-Ferradas & Alfaro-Tanco, 2016) are in agreement, through their studies, in that the models of open innovation do not only depend on internal factors of the enterprises such as their R&D capacity or their technological stock available, but intrinsic factors of the industry in which the enterprise operates also intervene. From this perspective, once again, the elements of the context (internal or external) are related to the type of knowledge for administering the processes of open construction and innovation in the organizations and in science itself.

The interrelation between open science, innovation and co-creation has important vacuums in research. Randhawa, Wilden, and Hohberger (2016) conducted a systematic revision, and they found absences in knowledge in existing research, among which we find that the researchers do not sufficiently base their work on theoretical perspectives that are external to the field to examine multiple facets of open innovation. Likewise, the studies that are centred in open innovation businesses are focused on role of knowledge, without delving into technology and R&D from the perspective of the innovative company. Another challenge is presented by Huizingh (2011) when the author concludes that the dependence of the context of open innovation is one of the less-understood subjects; more research on the characteristics of the external and internal environments that affect their performance is required. Accordingly, Wallin and Von Krogh (2010) have said that the challenge is to find the place of knowledge, and later try to integrate diverse domains of knowledge in open innovation. Uziénĕ (2015) alerts that the limits become blurred in the co-creation of something new, and in this sense, the intangible resources, such as intellectual capital, become a factor of influence for open innovation. Sloep and Berlanga (2011) state, through a study of formal and informal networks, that co-construction requires bonds of trust, the creation of profiles in the

learning networks, and the creation of instances of support among the participants. Along the same lines, and related to informal learning, García-Peñalvo and others (2013) define a methodology for the co-creation of an e-portfolio of informal learning activities that could act as the focal point for decision-making for a person and the company he or she works for.

It is from these absences that this article is presented, which has as the main objective the analysis of recent studies (2014-17) that have been conducted on the structuring of open science, co-creation of knowledge and open innovation, in order to understand what research has been conducted on this triangle, the contexts within which these practices have been developed, and which challenges have been detected to subscribe to open science. The results of this study will contribute knowledge that allows for the construction of theoretical frameworks and the contribution of directions for the practice of open access to knowledge.

## 2. Materials and methods

To conduct the study, a systematic review of the literature (SRL) was utilized as the strategy for identifying the most relevant studies on the challenges that open innovation and the open co-creation of knowledge have, within the field of open science. The SRL is used to identify, evaluate and interpret the available data within a period from a specific field of research. The process of this revision is based, in general terms, on the guidelines established by Brereton, Kitchenham, Budgen, Turner, and Khalii (2007), focused on the conducting of SRL in software engineering, and in specific terms, on the contributions by Higgins and Green (2006), Kitchenham (2004), Centre for Reviews and Dissemination de York University (2009). The three phases of the review are shown in Figure 1.

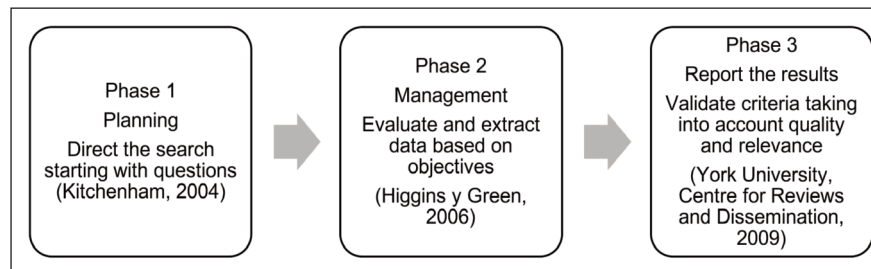


Figure 1. Process of systematic review of literature (author created, based on Higgins & Green, 2006; Kitchenham, 2004; Brereton & al., 2007; York University, Centre for Reviews and Dissemination, 2009).

## 3. Results

The steps taken in each phase and the results that emerged are described below.

a) Phase 1: Planning the review. The planning stage consisted in carrying out a strategy to direct the dataset search, which implied starting with questions that emerged due to the lack of knowledge detected, keywords, the choosing of specialized databases and defined search criteria. In the initial exploration, systematic searches and formal summaries of the literature were conducted to identify and classify the results of the studies on a subject in particular (Kitchenham, 2004). The objective of this study was focused on answering the following Research Questions:

- RQ1 How many studies are there in the SCOPUS and Web of Science (WoS) databases on open innovation, co-creation of open knowledge and open science, from January 2014 to May 2017, in open access journals?
- RQ2 What contexts (academic, business, social, cultural) have been the object of study in open science?
- RQ3 What are the challenges for open innovation and the co-creation of knowledge to drive open science?

The protocol for the review and the guidelines on how to select and evaluate the relevant studies was developed in the following manner:

- Search resources: SCOPUS (DB-S) and WoS (DB-W) databases.
- Categories and keywords: Open innovation, co-creation of knowledge and open science.
- Inclusion and exclusion criteria: Period of time: from January 2014 to May 2017; Type of document: articles; Type of Journal: open access; Defined field of study: open science; Language: English.

b) Phase 2: Management. The management phase was conducted to provide answers to RQ1: How many studies are there in the SCOPUS and Web of Science (WoS) databases on open innovation, co-creation of open knowledge and open science, from January 2014 to May 2017, in open access journals? The process, following the recommendations by Higgins and Green (2006) was comprised of the evaluation and extraction of the article's data by two people, independently and following a protocol of objectives of the review and steered for each new

review. The first search included the keywords in both databases (DB-S and DB-W); in the second search, only the articles that were found in open access journals, as related to the inclusion and exclusion criteria, were selected, and the duplicates were eliminated. In a third round, health and medicine subjects were eliminated, as they did not have any relation to open science (Table 1).

Keywords	First search				Second search			Third search	
	Articles with "open science" OR "open innovation" OR «co-creation of knowledge»		Articles delimited to open-access journals		Sub-total of the two open access databases	Duplica-tes	Open access in BD-S y BD-W	Eliminated for not being related to the field of open science	Selected for belonging to the field of open science
	BD-S	BD-W	BD-S	BD-W					
# open innovation	730	648	73	68	141	28	113	9	103
# open science	235	200	116	89	205	69	136	75	62
# co-creation of knowledge	15	12	2	2	4	1	3		3
<b>Totals</b>							<b>252</b>		<b>168</b>

The 168 delimited articles are accessible in the database (<https://goo.gl/eS7tH6>).

The extraction of data was conducted on the 168 articles selected that included all the criteria defined. They were classified to answer the research questions and are presented in Tables 1 and 2.

From the 168 articles, the countries that had the greatest number of publications were: United States (18), Brazil (15), Germany (13), Spain (13), Finland (11) and the United Kingdom (10). Figure 2 shows the geographical distribution, where the size of the circles graphically indicates the number of publications that each country has generated.

Range	Open innovation	Open science	Co-creation of knowledge	Total
2014	18	9		
2015	31	20	1	
2016	46	23	1	
May 2017	8	10	1	
<b>Total</b>	<b>103</b>	<b>62</b>	<b>3</b>	<b>168</b>

c) Phase 3: Report of the results. Lastly, to create the report for RQ2: Which contexts (academic, business, social, cultural)

have been chosen as the object of study in open science? And RQ3: What are the challenges (difficulties, problems, areas of opportunity) for open innovation and the co-creation of knowledge to drive open science? A validation process was conducted where the criteria by the University of York, Centre for Reviews and Dissemination (2009) were used: Criteria of inclusion and exclusion of the review, coverage of the relevant studies, evaluation of quality/ validity of the studies included and description of data / basic studies.

In RQ2:

What contexts (academic, business, social, cultural) have been chosen as the object of study in open science? Content analysis was conducted to identify the publication's sector. The results were drawn in Tableau, by number of articles,

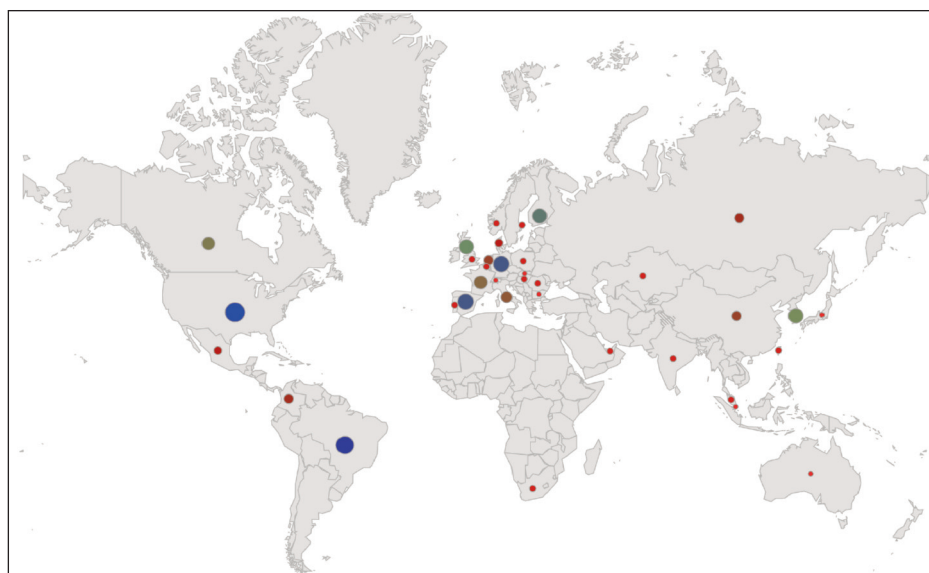


Figure 2. Publications according to the country.

which at the same time, were organized according to the year. Figure 3 uses colour to identify the occurrence of the publications to outline data on the sectors addressed in the articles: academic, business, social and cultural.

The studies analyzed show that the open science experiments have been most commonly conducted in the business sector (Bauer, Berleant, Cornell, & Belford, 2015; Hackseq Organizing Committee, 2017; Katsikis, Lang, & Debreczeny, 2016; Krause & Schutte, 2016; Oumlil & Juiz, 2016; Arabito & Pitrelli, 2015; Poehlman, Ryngé, Branton, Balamurugan, & Feltus, 2016; Pernet & Poline, 2015; Rodríguez-Ferradas & Alfaro-Tanco, 2016; Sarrión-Viñes & Vidal, 2016; Seguí-Mas, Signes-Pérez, Shim, & Park, 2016; Yang & Wang, 2016; Yoon, Shin, & Lee, 2016; Zander & Kralisch, 2016).

This was followed by articles related to the academic sector (Bond-Lamberty, Smith & Bailey, 2016; Bubela, Guebert, & Mishra, 2015; Carey, Davis, Ferreras, & Porter, 2015; Lahti, Ilomäki & Tolonen, 2015; Lee, Workman, & Jung, 2016; Lenart-Gansiniec, 2016; Schmidt, Orth, Franck, Kuchma, Knoth, & Carvalho, 2016; Labastida i Juan, 2015; Tandon, Singh, Clover, & Hall, 2017; Yun, Jeong, & Park, 2016).

In third place we find the articles from the social sector (Ayrís, 2017; Castillo-Molina, 2016; Chalk, 2016; Das & al., 2016; Schuurman, De-Marez, & Ballon, 2016; Joly, Dalpé, So, & Birko, 2015; Higham, Batty, Bettencourt, Greetham, & Grindrod, 2017; Hormia-Poutanen & Forsström, 2016; Jørgensen & al., 2015; McCormick, Liu, Ibanez, & Jomier, 2014; Ojasalo & Tähtinen, 2016; Okret-Manville, 2016; Lhoste & Barbier, 2016; Tukiainen, Leminen, & Westerlund, 2015; Naqshbandi, Singh, & Ma, 2016).

In RQ3: What are the challenges (difficulties, problems, areas of opportunity) for open innovation and the creation of knowledge to drive open science? A content analysis was conducted, keywords from the challenges described by the authors in their text descriptions were defined, and these data were cross-referenced with the contexts identified, with the results used to create a diagram in Tableau (Figure 4). The findings show that there was a greater incidence in three great areas: innovation, openness and research, in the more-common contexts (business, academic and cultural).

On the challenge of open innovation, for example in the social sector, Hughes (2017) states the need to create new forecasting models that include a combination of analysis of technological sequencing and great data tools within the organizations, the government and industry, at the same time that experts from the entire spectrum of open innovation are profited from. In the business sector, Tripathi (2016) postulates fomenting collaboration to work in open innovation in businesses and to promote the intensity of R&D, the ability and the capacity to take on risks, as well as the nature of the business and industry.

Another major challenge was the "openness", such as the capacity of the converging of instances of openness that allows for the dissemination into diverse sectors, for example, in the business sector. Buttlere (2014) states that the best way to realign the individual and group motives would probably be the creation of a centralized platform that is easy to use, with a profile, a review of specific scientific stories, based on the previous interaction of the system, a sophisticated section (public) of discussion and the impact of metrics that use the associated data. Also in the academic sector, Carey, Davis, Ferreras, and Porter (2015) bet for pedagogy with support from open edu-

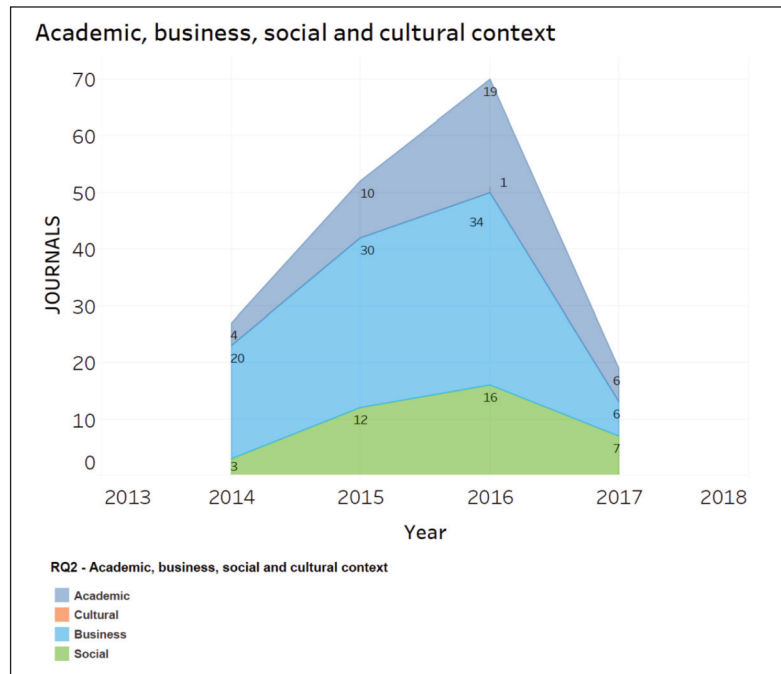


Figure 3. Publication according to the contexts.

cation resources, to create a greater teacher commitment in the integration and mobilization of diverse sources of knowledge in teaching.

On the area of research, for example, in the social sector, Aleksic and others (2015) mention that it should be fomented in the community that is constantly (and consciously) up to date on the principles of open science, so that the published documents are improved, to increase the confidence in the reproducibility of the work, and in the last case, to provide strategic benefits to the authors and their institutions. Likewise, in the business sector, McCormick, Liu, Jomier, Marion, and Ibanez (2014) mention the supporting of research communities with the most modern infrastructure of verification of reproducibility, as the challenge.

#### 4. Discussion and conclusions

Open science opens a wide spectrum of possibilities for production of resources and use in social and cultural areas for collective creation, and with this, to propound shared knowledge. In recent years, technologies and the internet have made open practices possible, and at the same time, the academic community has been contributing evidence on the findings that have emerged. However, the empirical contributions still have areas of opportunities to explore (mainly within social and cultural contexts); from this perspective, this article focused on the treatment, through a review of recent literature (2014-17), of the triangle between shared science, co-construction, and open innovation, as the new meeting point for opportunities to support theoretical frameworks and open practices.

The context (defined as the space where it is constructed) can mark a substantial difference in the possibilities of innovation and open science. The data analyzed allowed for the finding, in the length of time explored in both databases (SCOPUS and WoS), of 168 open access articles. The context data placed most of the publications in the United States, Brazil and Germany (Figure 2). Likewise, the publication contexts (Figure 3) mainly pointed to the business and academic contexts (followed very closely by the social sector). Huizingh (2011), and Wallin and Von-Krogh (2010) are in agreement when pointing to the importance of finding the context to try to integrate the knowledge of how open science and innovation are being shaped. Beginning with these data, different issues for theoretical frameworks can be found that contextualize the open scientific knowledge, from the contextual and disciplinary views where these open practices are being developed, up to the possibilities of joint construction. Aspects such as the objectives, the reasoning and the contributions are comprehensible when they are analyzed in light of the publications that are being contributed. More interestingly, was detecting that the cultural sector represents an area of opportunity for the subject of open science.

Open science brings with it the possibility of shared co-construction and the generation of open innovation, to contribute to the public sphere as well as private contexts. Although the contributions have been provided in the

#### Challenges are identified in open science studies for the co-creation of knowledge and innovation in open

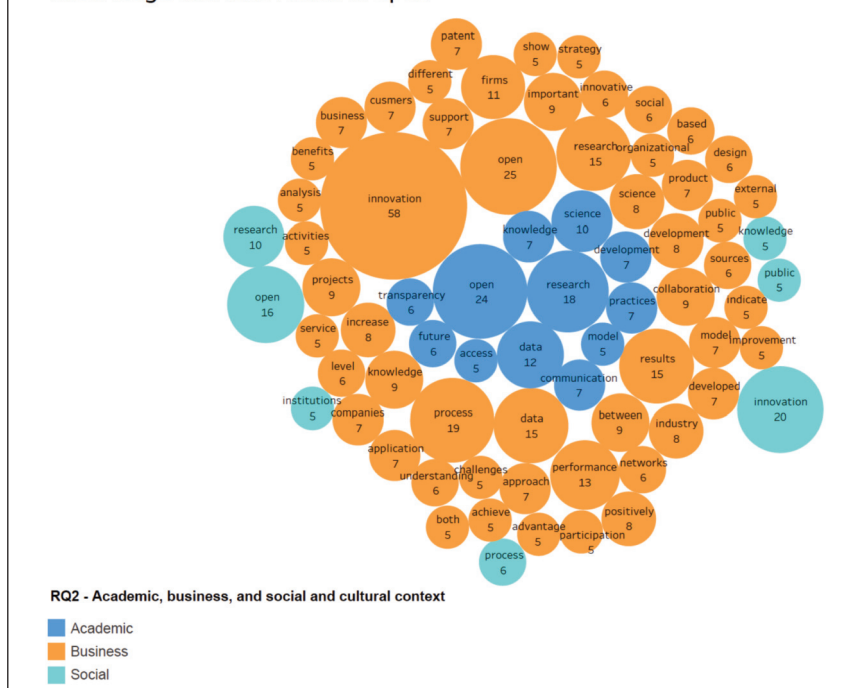


Figure 4. Challenges of open innovation and co-creation for driving open science.

last decades, there is still much to be done in the practices of open access. The authors of the articles analyzed demonstrate the challenges they found in order to keep on expanding the subject of open science. In Figure 4, the areas of opportunity that are still in need of work are highlighted: innovation, openness and research. Sloep and Berlanga (2011), and Užienė (2015) warn on the difficulties of delimiting the co-creation of something new and the collaboration that they contribute to open science. Collaborative construction becomes, in this sense, substantial for the continued contribution in the area of open science.

The intersection of the triangle between shared science, co-construction, and open innovation gives rise to an interesting opportunity of analysis for linking it to ethical considerations. Most notably, the implications to science, more specifically within the contexts of education, humanities, communication, media literacy studies, qualitative data, citizen science, among other subjects that were addressed in this article, requires a special view to nurture scientific research, contribute possibilities for development, and the use of technologies with open access. The UNESCO (2004) subscribes to paying attention to training processes on ethics competencies to work on standards of integrity, agreement and collaboration. Although reality makes us see that the advances in science could play a destructive role, they can also play another role in the assertiveness of tending to needs and problems that could create better conditions of life in a world that requires positive energy from all.

In addition to the ethical implications, the data found in this study link other consequences for science, in the sense that new forms of construction of knowledge, new participating actors, new interrelations of disciplines, new possibilities for opening the knowledge created, and new tools for the transferring of this knowledge became evident. These implications can become engines for innovation, the resolution of problems and the creative planning of possibilities for civil society. However, there is still a long road ahead, from the public policies, the systems of funding, the closed systems linked to business models that are unrelated to the common good, to the promotion of changes that push for a culture of collaboration that promotes open knowledge for society. Open science therefore represents an interesting issue for the learning processes in any area and context.

This article presents original data that can support future studies on open science, co-construction, and educational innovation. The database of the articles can be used as a foundation for studies that analyze other theoretical/practical elements (types of practices, methodologies, tools, among other aspects). The study of the literature review was delimited to open-access articles, intending to be consistent with the possibilities of openness to knowledge. However, due to this delimitation, a great number of articles were not analyzed (Table 1), and this could be a limiting factor in the generalizing of the data that emerged, and at the same time, it could also be a new possibility for the continuous contribution to the subject of science and shared knowledge. Thereby, the present document is an invitation for the continuous search for shared construction alternatives that support the democratization of knowledge through open practices.

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**Open science brings with it the possibility of shared co-construction and the generation of open innovation, to contribute to the public sphere as well as private contexts. Although the contributions have been provided in the last decades, there is still much to be done in the practices of open access. The authors of the articles analyzed demonstrate the challenges they found in order to keep on expanding the subject of open science.**

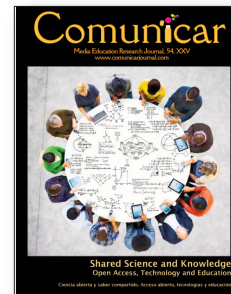
## References

- Aleksic, J., Alexa, A., Attwood, T.K., Hong, N.C., Dahlö, M., Davey, R., ... Lahti, L. (2015). An open science peer review oath. *F1000Research*, 2015, 3, 271. <https://doi.org/10.12688/f1000research.5686.2>
- Álvarez, E.G., & Sintas, J.L. (2012). Ciencia abierta, e-ciencia y nuevas tecnologías: Desafíos y antiguos problemas en la investigación científica en las ciencias sociales. *Intangible Capital*, 8(3), 497-519. <https://doi.org/10.3926/ic.384>
- Arabito, S., & Pitrelli, N. (2015). Open Science training and education: challenges and difficulties on the researchers' side and in public engagement. *Journal of Science Communication*, 14(04), C01\_en. (<https://goo.gl/MYUB8V>).
- Ayris, P. (2017). Brexit - and its potential impact for open access in the UK. *Insights*, 30(1), 4-10. <https://doi.org/10.1629/uksg.336>
- Bauer, M.A., Berleant, D., Cornell, A.P., & Belford, R.E. (2015). WikiHyperGlossary (VHG): An information literacy technology for chemistry documents. *Journal of Cheminformatics*, 7(1), 22. <https://doi.org/10.1186/s13321-015-0073-7>
- Betancourt, M.C., Celaya, R., & Ramírez-Montoya, M.S. (2014). Open educational practices and technology appropriation: The case of the regional open Latin American community for social and educational research. *RUSC*, 11(1), 4-17. <https://doi.org/10.7238/rusc.v11i1.1794>
- Bond-Lamberty, B., Smith, A.P., & Bailey, V. (2016). Running an open experiment: Transparency and reproducibility in soil and ecosystem science. *Environmental Research Letters*, 11(8), 084004. <https://doi.org/10.1088/1748-9326/11/8/084004>
- Brereton, P., Kitchenham, B.A., Budgen, D., Turner, M., & Khalil, M. (2007). Lessons from applying the systematic literature review process within the software engineering domain. *Journal of Systems and Software*, 80(4), 571-583. <https://doi.org/10.1016/j.jss.2006.07.009>
- Bubela, T., Guebert, J., & Mishra, A. (2015). Use and misuse of material transfer agreements: Lessons in proportionality from research, repositories, and litigation. *PLoS Biol*, 13(2), e1002060. <https://doi.org/10.1371/journal.pbio.1002060>
- Buttlere, B.T. (2014). Using science and psychology to improve the dissemination and evaluation of scientific work. *Frontiers in Computational Neuroscience*, 8, 82. <https://doi.org/10.3389/fncom.2014.00082>
- Carey, T., Davis, A., Ferreras, S., & Porter, D. (2015). Using open educational practices to support institutional strategic excellence in teaching, learning & scholarship. *Open Praxis*, 7(2), 161-171. <https://doi.org/10.5944/openpraxis.7.2.201>
- Castillo-Molina, Y.Y. (2016). Propuesta de un modelo para gestionar la innovación abierta en los Núcleos de Innovación del Cauca-Colombia. *Revista Gestión de las Personas y Tecnología*, 9(25), 72-85. (<https://goo.gl/S9WdCL>).
- Chalk, S.J. (2016). The open spectral database: An open platform for sharing and searching spectral data. *Journal of Cheminformatics*, 8(1), 55. <https://doi.org/10.1186/s13321-016-0170-2>
- Centre for Reviews and Dissemination (Ed.) (2009). *Systematic Reviews. CRD's guidance for undertaking reviews in health care*. York, UK: CRD, University of York. (<https://goo.gl/731Ehh>).
- Dahlander, L., & Gann, D.M. (2010). How open is innovation? *Research Policy*, 39(6), 699-709. <https://doi.org/10.1016/j.respol.2010.01.013>
- Das, S., Glatard, T., Rogers, C., Saigle, J., Paiva, S., MacIntyre, L., ... MacFarlane, D. (2016). Cyberinfrastructure for open science at the Montreal Neurological Institute. *Frontiers in Neuroinformatics*, 10, 53. <https://doi.org/10.3389/fninf.2016.00053>
- Franzoni, C., & Sauermann, H. (2014). Crowd science: The organization of scientific research in open collaborative projects. *Research Policy*, 43(1), 1-20. <https://doi.org/10.1016/j.respol.2013.07.005>
- García-Arteaga, D., & Rendueles, C. (2014). Abierto, libre... y público. Los desafíos políticos de la ciencia abierta. *Argumentos de Razón Técnica*, 17, 45-64. (<https://goo.gl/Xoh3a1>).
- García-Peñalvo, F.J., Conde, M.A., Johnson, M., & Alier, M. (2013). Knowledge co-creation process based on informal learning competences tagging and recognition. *International Journal of Human Capital and Information Technology Professionals*, 4(4), 18-30. <https://doi.org/10.4018/ijhctip.2013100102>
- García-Peñalvo, F.J., García-de-Figuerola, C., & Merlo-Vega, J.A. (2010). Open knowledge: Challenges and facts. *Online Information Review*, 34(4), 520-539. <https://doi.org/10.1108/14684521011072963>
- Hackseq Organizing Committee (2017). Hackseq: Catalyzing collaboration between biological and computational scientists via hackathon. *F1000Research*, 6, 10. <https://doi.org/10.12688/f1000research.10964.1>
- Higgins, J.P., & Green, S. (Eds.) (2006). Cochrane handbook for systematic reviews of interventions 4.2.6. *The Cochrane collaboration*. (<https://goo.gl/6uU6tM>).
- Higham, D.J., Batty, M., Bettencourt, L.M., Greetham, D.V., & Grindrod, P. (2017). An overview of city analytics. *Royal Society Open Science*. <https://doi.org/10.1098/rsos.161063>
- Hormia-Poutanen, K., & Forsström, P. (2016). Collaboration at international, national and institutional level – Vital in fostering open science. *Liber Quarterly*, 26(1), 3-12. <https://doi.org/10.18352/lq.10157>
- Hughes, S.F. (2017). A new model for identifying emerging technologies. *Journal of Intelligence Studies in Business*, 7(1), 79-86. (<https://goo.gl/yKd3fA>).
- Huizingh, E.K. (2011). Open innovation: State of the art and future perspectives. *Technovation*, 31(1), 2-9. <https://doi.org/10.1016/j.technovation.2010.10.002>
- Joly, Y., Dalpé, G., So, D., & Birko, S. (2015). Fair shares and sharing fairly: A survey of public views on open science, informed consent and participatory research in biobanking. *PLoS One*, 10(7), e0129893. <https://doi.org/10.1371/journal.pone.0129893>
- Jørgensen, P.S., Barraquand, F., Bonhomme, V., Curran, T.J., Cieraad, E., Ezard, T.G., ... Zimmerman, N. (2015). Connecting people and ideas from around the world: Global innovation platforms for next-generation ecology and beyond. *Ecosphere*, 6(4). <https://doi.org/10.1890/ES14-00198.1>
- Katsikis, N., Lang, A., & Debreczeny, C. (2016). Evaluation of open innovation in B2B from a company culture perspective. *Journal of Technology Management & Innovation*, 11(3), 94-100. <https://doi.org/10.4067/S0718-27242016000300011>
- Kitchenham, B.A. (2004). *Procedures for performing systematic reviews*. Keele University: Technical Report TR/SE-0401 and NICTA Technical Report 0400011T.1. (<https://goo.gl/wQcMaS>).
- Krause, W., & Schutte, C.S. (2016). Developing design propositions for an open innovation approach for SMEs. *South African Journal of Industrial Engineering*, 27(3), 37-49. <https://doi.org/10.7166/27-3-1625>






- Labastida-i-Juan, I. (2015). The time has come for managing and sharing research data in universities. *Journal of Science Communication*, 14(4). (<https://goo.gl/y1qndm>).
- Lahti, L., Ilomäki, N., & Tolonen, M. (2015). A quantitative study of history in the English short-title catalogue (ESTC), 1470-1800. *Liber Quarterly*, 25(2), 87-116. <https://doi.org/10.18352/lq.10112>.
- Lasthiotakis, H., Kretz, A., & Sá, C. (2015). Open science strategies in research policies: A comparative exploration of Canada, the US and the UK. *Policy Futures in Education*, 13(8), 968-989. <https://doi.org/10.1177/1478210315579983>
- Lee, S.H., Workman, J., & Jung, K. (2016). Perception of time, creative attitudes, and adoption of Innovations: A cross-cultural study from Chinese and US College Students. *Sustainability*, 8(11), 1193. <https://doi.org/10.3390/su8111193>
- Lenart-Gansiniec, R. (2016). Relational capital and open innovation - In search of interdependencies. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, 64(6), 2007-2013. <https://doi.org/10.11118/actaun201664062007>
- Lichtenthaler, U. (2011). Open innovation: Past research, current debates, and future directions. *Academy of Management Perspectives*, 25(1), 75-93. <https://doi.org/10.5465/amp.2011.59198451>
- Lhoste, E., & Barbier, M. (2016). FabLabs. L'institutionnalisation de Tiers-Lieux du 'soft hacking'. *Revue d'Anthropologie des Connaissances*, 10(1), 43-69. <https://doi.org/10.3917/rac.030.0043>
- McCormick, M.M., Liu, X., Ibanez, L., & Jomier, J. (2014). ITK: Enabling reproducible research and open science. *Frontiers in Neuroinformatics*, 8, 13. <https://doi.org/10.3389/fninf.2014.00013>
- Mulder, F. (2013). The LOGIC of national policies and strategies for open educational resources. *International Review of Research in Open and Distance Learning*, 14(2), 96-105. <https://doi.org/10.19173/irrodl.v14i2.1536>
- Naqshbandi, M.M., Singh, S.K., & Ma, P. (2016). The link between organisational citizenship behaviours and open innovation: A case of Malaysian high-tech sector. *IIMB Management Review*, 28(4), 200-211. <https://doi.org/10.1016/j.iimb.2016.08.008>
- OECD (Ed.) (2012). *Connected minds: Technology and today's learners*. Paris: OECD. <https://doi.org/10.1787/9789264111011-en>
- National Knowledge Commission. (2007). *Report to the Nation 2007*. New Delhi: Government of India. (<https://goo.gl/WbkkAE>).
- Ojasalo, J., & Tähtinen, L. (2016). Integrating open innovation platforms in public sector decision making: Empirical results from smart city research. *Technology Innovation Management Review*, 6(12). (<https://goo.gl/ottFqt>).
- Okret-Manville, C. (2016). Academic social networks and open access: French researchers at the crossroads. *Liber Quarterly*, 25(3), 118-135. <http://doi.org/10.18352/lq.10131>
- Olalla, M. F., Sandulli, F.D., Menéndez, J.F., & Duarte, A.R. (2014). ¿Cómo afectan las características de la industria a la relación entre la capacidad de I+D y la adopción de innovación abierta de entrada? *Economía Industrial*, 391, 23-32. (<https://goo.gl/73V968>).
- Oumlil, R., & Juiz, C. (2016). An Up-to-date Survey in barriers to open innovation. *Journal of Technology Management & Innovation*, 11(3), 137-152. <https://doi.org/10.4067/S0718-27242016000300016>
- Pernet, C., & Poline, J.B. (2015). Improving functional magnetic resonance imaging reproducibility. *GigaScience*, 4(1), 1-8. <https://doi.org/10.1186/s13742-015-0055-8>
- Poehlman, W.L., Rynge, M., Branton, C., Balamurugan, D., & Feltus, F.A. (2016). OSG-GEM: Gene expression matrix construction using the open science Grid. *Bioinformatics and Biology Insights*, 10, 133-141. <https://doi.org/10.4137/BBI.S38193>
- Ramírez-Montoya, M.S. (2015). Acceso abierto y su repercusión en la sociedad del conocimiento: Reflexiones de casos prácticos en Latinoamérica. *Education in the Knowledge Society*, 16(1), 103-118. <https://doi.org/10.14201/eks2015161103118>.
- Randhawa, K., Wilden, R., & Hohberger, J. (2016). A bibliometric review of open innovation: Setting a research agenda. *Journal of Product Innovation Management*, 33(6), 750-772. <https://doi.org/10.1111/jpim.12312>
- Rodríguez-Ferradas, M.I., & Alfaro-Tanco, J.A. (2016). Open innovation in automotive SMEs suppliers: An opportunity for new product development. *Universia Business Review*, 50, 142. <https://doi.org/10.3232/UBR.2016.V13.N2.05>
- Schmidt, B., Orth, A., Franck, G., Kuchma, I., Knoth, P., & Carvalho, J. (2016). Stepping up open science training for European research. *Publications*, 4(2), 16. <https://doi.org/10.3390/publications4020016>
- Schuurman, D., De-Marez, L., & Ballon, P. (2016). The impact of living lab methodology on open innovation contributions and outcomes. *Technology Innovation Management Review*, 6(1), 7-16. (<https://goo.gl/DmwJRP>).
- Schuurman, D., & Tönurist, P. (2017). Innovation in the public sector: Exploring the characteristics and potential of living labs and innovation labs. *Technology Innovation Management Review*, 7(1), 7-14. (<https://goo.gl/pqVcQy>).
- Seguí-Mas, E., Signes-Pérez, E., Sarrión-Viñes, F., & Vidal, J.A. (2016). Bibliometric analysis of the international literature on open innovation and absorptive capacity. *Intangible Capital*, 12(1), 51-72. <https://doi.org/10.3926/ic.685>
- Shim, S.O., & Park, K. (2016). Technology for production scheduling of jobs for open innovation and sustainability with fixed processing property on parallel machines. *Sustainability*, 8(9), 904. <https://doi.org/10.3390/su8090904>
- Sloep, P., & Berlanga, A. (2011). Learning networks, networked learning. [Redes de aprendizaje, aprendizaje en Red]. *Comunicar*, 37(19), 55-63. <https://doi.org/10.3916/C37-2011-02-05>
- Tandon, R., Singh, W., Clover, D., & Hall, B. (2017). Knowledge democracy and excellence in engagement. *IDS Bulletin*, 47(6), 19-35. <https://doi.org/10.19088/1968-2016.197>
- Tripathi, S.S. (2016). Open innovation in Indian organizations: Types of collaboration. *Technology Innovation Management Review*, 6(5), 15-23. (<https://goo.gl/yqXrbb>).
- Tukiainen, T., Leminen, S., & Westerlund, M. (2015). Cities as collaborative innovation platforms. *Technology Innovation Management Review*, 5(10), 16-23. (<https://goo.gl/UrrtGB>).
- Užienė, L. (2015). Open innovation, knowledge flows and intellectual capital. *Procedia-Social and Behavioral Sciences*, 213, 1057-1062. <https://doi.org/10.1016/j.sbspro.2015.11.525>
- UNESCO (Ed.) (2004). Ética de la Ciencia y la Tecnología. *Contacto*, XXIX(3-4). (<https://goo.gl/FGvb8S>).
- Wallin, M.W., & Von-Krogh, G. (2010). Organizing for open innovation. *Organizational Dynamics*, 39(2), 145-154. <https://doi.org/10.1016/j.orgdyn.2010.01.010>

- Yang, M., & Wang, J. (2016). Overflow mechanism and demonstration of knowledge flow on enterprise endogenous innovation by the three-dimensional space: Based on the open innovation perspective. *International Journal of Security and Its Applications*, 10(3), 321-332. <https://doi.org/10.14257/ijisia.2016.10.3.28>
- Yoon, B., Shin, J., & Lee, S. (2016). Open innovation projects in SMEs as an engine for sustainable growth. *Sustainability*, 8(2), 146. <https://doi.org/10.3390/su8020146>
- Yun, J.J., Jeong, E., & Park, J. (2016). Network analysis of open innovation. *Sustainability*, 8(8), 729. <https://doi.org/10.3390/su8080729>
- Zander, F., & Kralisch, S. (2016). River basin information system: Open environmental data management for research and decision making. *ISPRS International Journal of Geo-Information*, 5(7). <https://doi.org/10.3390/ijgi5070123>



# Assessing the ethical and content quality of online parenting resources

## Evaluación de la calidad ética y del contenido de los recursos online para padres

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### ABSTRACT

The quality of the online resources for parents offering access to open knowledge has hardly received attention despite their increasing number. This paper provides a framework to examine the ethical and content quality of parenting resources. The ethical criteria were based on “the Health on the Net” (HON) framework whereas the content criteria were based on the Positive Parenting framework and the effectiveness of the learning materials used. The criteria were applied to a survey of international websites (n=100) for Spanish-speaking parents. Chi-square analyses showed that websites from Spain, official companies sites and information sites, as compared to South American, parents’ and interactive sites, scored higher in the ethical criteria of privacy, authority, justifiability and financial disclosure. Hierarchical cluster analysis applied to content criteria showed that the High quality websites, unlike the Low quality ones, valued gender equality, a positive parental role, modeled a variety of parenting practices, educational contents with multimedia formats, and made use of experiential, academic and technical information. Privacy, financial disclosure and justifiability were more likely to be found in the High and Medium quality content clusters. In conclusion, the study illustrates some of the challenges of open knowledge and sets out the priority areas for quality improvement for website designers and for professionals who want to help parents develop effective skills for searching for trustworthy sources.

### RESUMEN

La calidad de los recursos online para padres que permiten acceder al conocimiento en abierto apenas ha recibido atención a pesar de su incremento. Este estudio analiza la calidad tanto ética como de contenido de dichos recursos. Los criterios éticos están basados en los de «Salud en la Red» (HON), mientras que los de contenido se basan en los principios de la Parentalidad Positiva y la efectividad de los materiales de aprendizaje usados. Los criterios se aplicaron a una muestra de webs internacionales (n=100) para padres y madres hispanohablantes. Los análisis de Chi-cuadrado mostraron que los sitios web españoles, de empresas oficiales e informativos obtuvieron una calificación más alta en los criterios éticos que los recursos de Sudamérica, de padres e interactivos, en privacidad, autoridad, justificabilidad e información financiera. El Análisis Jerárquico de Clúster aplicado a los criterios de contenido mostró que los sitios web de alta calidad, a diferencia de los de baja calidad, valoraban la igualdad de género, un rol parental positivo, modelaban una variedad de prácticas parentales, contenidos educativos con formatos multimedia y proporcionaban experiencias, información académica y técnicas. La privacidad, la información financiera, y la justificabilidad eran más característicos de los clúster con contenidos de Alta y Media calidad. En conclusión, el estudio ilustra algunos de los retos del conocimiento en abierto y define las áreas prioritarias para la mejora de la calidad para los diseñadores de webs y para los profesionales que quieren ayudar a los padres a desarrollar habilidades para buscar fuentes confiables.

### KEYWORDS | PALABRAS CLAVE

Website quality, ethical criteria, content criteria, web-based support, cluster analysis, e-parenting, online resources, positive parenting.

Calidad websites, criterios éticos, criterios de contenido, apoyo web, análisis de clúster, parentalidad online, recursos online, parentalidad positiva.

## 1. Introduction

Nowadays, parents use the Internet as an important source of information to support their parenting and better promote their children's development and family wellbeing (Dworkin, Connell, & Doty, 2013; Niela-Vilén, Axelin, Salanterä, & Melender, 2014; Nieuwboer, Fukkink, & Hermanns, 2013a; 2013b). The use of the Internet and social media for parenting purposes allows parents to obtain information and counseling from experts but also to exchange experiences with other parents and create virtual communities around certain child-rearing topics (Madge & O'Connor, 2006; Myers-Walls & Dworkin, 2015; McDaniel & al., 2011; Muñetón, Suárez, & Rodrigo, 2015). The Internet offers a range of opportunities for e-empowerment, giving means through which parents can increase their competence at personal, social and citizenship levels, perceived self-efficacy and autonomous decision making about child-rearing issues (Amichai-Hamburger & al., 2008). In sum, parents are not only in the hands of experts, but they can produce and communicate information by themselves, heading towards open knowledge models where information is primarily produced in digital formats and consumed through online media (García-Peñalvo, García de Figuerola, & Merlo-Vega, 2010).

Parents' use of the Internet does not come without risks since they determine when, where, which and how to access information from some websites that may not rely on credible and reliable sources. The responsibility to access high-quality, reliable educational content that used to rest primarily on the expert/educator has been partly transferred to parents, who should be skillful enough to conduct efficient searches and properly evaluate the outcomes (Dworkin & al., 2013; Ebata & Curtiss, 2017; Rothbaum, Martland, & Janssen, 2008; Suárez, Rodrigo, & Muñetón, 2016). However, the extent to which online parenting resources provide effective support to parents also depends on the quality of the websites browsed. Website designers and online service providers should also take responsibility and offer websites that meet high-quality standards to provide consumers with credible information prepared for general audiences spanning the world.

Notably, quality standards of websites for the parenting domain have not yet been well established or tested on empirical grounds (Myers-Walls & Dworkin, 2016). The present study proposes a framework to evaluate the quality of online parenting resources based on ethical and content criteria, since the design, organization, and user-friendly quality standards of the parenting websites have received more attention in the online parenting literature (Hughes & al., 2012; Myers-Walls & Dworkin, 2015). The idea is to identify ethical and content standards and to empirically test their application to a sample of websites for Spanish-speaking parents. On the practical side, our study would help to reveal differences in the quality of websites offered to parents in the large community of Spanish-speaking Internet users. Spanish is the third-most-spoken language on the Internet and the second on the social networks.

In a recent review, Ebata and Curtiss (2017) listed some criteria that may be helpful in determining if a parenting website has a quality information (e.g., the website has a legitimate authority, the authorship is provided, the purpose of the information is declared, the information is justified on scientific evidence, and the information is current and accurate). However, there is a need to support the selection of the quality standards on a more theoretical basis. Cheung & al. (2008) have proposed a model for the WOM (word-of-mouth) communication defining two important factors for information adoption: source credibility and information quality. Sources credibility involves source expertise and source trustworthiness. Information quality involves relevance, timeliness, accuracy, and comprehensiveness. This model was used in the current study to test the pertinence and relative importance of both factors as quality criteria of parenting websites.

We selected criteria related to source credibility following the ethical standards defined by "Health on the Net" (HON, 2017) (<https://goo.gl/JNDPg9>) aimed at improving the ethical quality of medical and health information on the Internet. Ethical standards in the Internet context reflect the principles that websites should follow to respect the consumers' rights in agreement with fairness, accountability and trustworthy issues. The HON system certifies websites based on a code of conduct in widespread use: it covers over 35 languages and has been adapted to cultural differences and regulations around the world (Baujard & al., 2010). For this study, the following criteria were used: authority, privacy, attribution, justifiability, transparency, financial disclosure and advertising policy (see Method, Table 3 for a description).

As for the information content, we selected criteria that reflect aspects related to the adequacy of the information (relevance, timeless and accuracy) and its learnability (comprehensiveness) to provide effective support to parents. Adequacy of the information (a) was assessed following the Council of Europe's Recommendation 19/2006 (Council of Europe, 2006) on positive parenting, whereas learnability of information (b) was assessed following the

literature on the characteristics of parenting websites that may foster effective learning (Dworkin & al., 2013; Hughes & al., 2012; Myers-Walls & Dworkin, 2015; Rothbaum & al., 2008). According to (a), the Council of Europe's Recommendation provides a modern view of positive parenting, and what is needed for support in our societies. Furthermore, this evidence-based framework is widely accepted and applied in Spain (Rodrigo & al., 2016) and the rest of Europe (Rodrigo & al., 2016) and is gradually spreading to other Spanish-speaking countries (Rodrigo & al., 2015).

Under this framework, it is important to pay attention to several aspects: the sites' orientation on gender equality and family patterns; whether the view of the parental role was positive (stressing parental capabilities and skills) or negative (stressing difficulties and problems), and whether the website mentioned a variety of child-rearing practices rather than a single positive or negative instance (as simple recipes). According to (b), an important aspect of content quality is that the infor-

mation provided on the website may foster effective learning (Dworkin & al., 2013; Hughes & al., 2012; Myers-Walls & Dworkin, 2015; Rothbaum, Martland, & Janssen, 2008). We focused on the following aspects: whether it provides a variety of educational content, a variety of multimedia materials, such as pictures, video, text and animated simulations; a variety of communication tools to support interactive exchanges; and finally, whether it presents mixed information involving personal experiences, concepts, research findings and child-rearing techniques (see Method, Table 4 for a description).

**The Internet has become a crucial information and support source for parents, which provides an interesting example of open knowledge management in an informal educational context. It is in the parenting domain where the danger of exposing consumers to evidence-based contents, biased values, poor e-learning environments and hidden commercial purposes is presumably greater than informal educational contexts. Regrettably, the assessment of the quality of online parenting support and education is still an emerging field.**

This study addresses a systematic assessment of the ethical and content criteria, based on the model of the information adoption (Cheung & al., 2008), applicable to a sample of parenting websites in Spanish. Our first research question was to identify the website characteristics (type of website, origin, type of entity, purpose, and audience) associated with their ethical quality. We hypothesized that mainly the type of entity (e.g., public agencies) responsible for the website would be related to higher ethical standards to protect the consumers' rights. Type of entity is also a relevant feature for parents with more proficiency in using the Internet for parenting purposes (Muñetón, Suárez, & Rodrigo, 2015; Suárez, Rodrigo, & Muñetón, 2016). Country of origin could also be relevant due to the huge differences in Internet penetration rates in Spanish-speaking countries involving two continents (e.g., Spain and South-American countries; Live Internet Stats, 2016) that may have an impact on the quality of the websites for parents.

Our second research question was to examine the extent to which the websites' ethical quality was related to the quality of their content. Both ethical and content criteria could be expected to be relevant and probably mutually related for high-quality websites. Parents deserve that the information available followed ethical standards that guarantee its credibility, and they also deserve the proper informational message that guarantees a positive exercise of parenting.

A person-centered approach (Bergman & al., 2003) was used to identify different groups of websites with similar content criteria configurations, enhancing our knowledge about the potential combination of quality criteria there could be. In what follows, the methodology used to select the websites, the results obtained after the application of the quality criteria and their practical implications are described.

## 2. Material and methods

### 2.1. Sampling of websites

The search was carried out in May and June 2016 using Google and Yahoo as search engines, and the strategy involved conducting Boolean searches of various key words related to the parenting domain (Table 1). The criteria for including a resource in the sample were as follows: first, it should be a webpage or blog, as these are the main formats used to convey online parenting information; second, either direct or logged in access should be free; and third, the primary components of the resource should be educational or on family health-related issues. The exclusion criteria were as follows: first, the resource could not be a commercial website; second, the type of entity could not be inaccessible; third, the origin could not be inaccessible; and fourth, formats such as newsletters, magazines, eBooks, and curriculum guides were not included. As a result, 100 websites were selected out of 175 entries, with 48% from Google and 52% from Yahoo with no overlaps in the search results.

### 2.2. Evaluation checklist and reliability of coding scheme

The evaluation checklist consisted of two sets of criteria: seven ethical criteria (Table 3) and eight content criteria (Table 4).

Descriptions of each criterion and the coding scheme used are provided. All HON criteria were adapted to the parenting field, with the exception of complementarity (information should support, not replace, the doctor-patient

**Table 1. Search terms, search engine used and outcome of the selection process**

Search terms	Entries		Selected	
	Google	Yahoo	Google	Yahoo
"parenting 'AND' education 'OR' child-rearing"	8	10	3	5
"education 'AND' parents 'OR' children"	24	15	12	10
"parenthood 'OR' motherhood 'AND' education"	24	20	10	14
"parenting 'AND' positive 'OR' education"	19	17	8	11
"parenting 'AND' positive 'OR' child-rearing"	20	18	15	12
Total	95	80	48	52

Note: search terms in Spanish are: parentalidad / educación / crianza; educación / padres / niños; paternidad / maternidad / educación; Parentalidad / positiva / educación; parentalidad / positiva / crianza.

**Table 2. Distribution of website characteristics in the simple (n=100)**

Variable	%	Variable	%
<b>Type of website</b>		<b>Purpose</b>	
Webpage	53	Information	59
Blog	47	Interaction with experts and peers	41
<b>Origin (Spanish-speaking zones)</b>			
Spain	27	<b>Audience (parents with children)</b>	
North America (USA, Mexico)	35	0 to 11 years	32
South America (Chile, Colombia, Argentina)	38	Adolescent children	13
<b>Type of entity</b>		Children of any age	55
Public agency	13		
Company	22		
NGO	19		
Expert	29		
Parents	17		

**Table 3. List of the ethical standards for parenting websites (HON, 2017)**

Criterion	Description
1. Authority	Indicates the authorship: unknown authorship; experts in education and psychology; experts in other subjects; parents. (0) Absence; (1) Presence.
2. Privacy	Declares to respect the privacy and confidentiality of personal data submitted to the site by the visitor. (0) Absence; (1) Presence.
3. Attribution	Information supported by clear references to source data and, where possible, with specific HTML links to that data. (0) Absence; (1) Presence.
4. Justifiability	Makes clear claims about the benefits of any recommendation / expert advice and backs up these claims with scientific evidence. (0) Absence; (1) Partial (one element); (2) Full (both elements).
5. Transparency	Provides working email address or contact form, makes it easy to access from anywhere on the site, and provides prompt answer to website visitors' enquiries: (0) Absence; (1) Partial (one or two elements); (2) Full (all three elements).
6. Financial disclosure	Identifies website's funding sources and describes type of support. (0) Absence; (1) Partial (one element); (2) Full (both elements).
7. Advertising policy	Indicates that the site does not host or receive funding from advertising or from the display of commercial content. If the site displays advertisements it should clearly distinguish advertising from editorial content. (0) Absence; (1) Partial (one element); (2) Full (both elements).

relationship), which was excluded, given that it was not easily assessed and/or applied to the parenting domain.

The eight content criteria and respective coding systems were defined by consensus by a panel of four experts in the positive parenting framework and online parenting. Overall, the ethical criteria were evaluated using categorical variables,

whereas the content criteria used Likert-scale or cumulative (0-1) values. Two reviewers, other than the authors, independently evaluated the 100 websites. They were trained during 15 hours on how to apply the ethical and content quality criteria using ten websites that were not included in the analyses. Disagreements were resolved through discussion. After reaching a Kappa coefficient  $> 0.8$  in the training period as a recommended value

<b>Criterion</b>	<b>Description</b>
1. Gender equality	Language denotes an equal treatment of the parental task for women and men and/or differentially refers to boys and girls. Scale 0-2: (0) gender inequality (neither of these aspects); (1) intermediate (only one aspect); (2) gender equality (both aspects).
2. Family diversity	Refers to a diversity of family forms. Scale 0-2: (0) low diversity (not distinguishing any type of family); (1) medium diversity (mentions one or two types of family); (2) high diversity (mentions three or more types of family).
3. Parental role	Positive role: emphasizes parental capabilities and skills; showing love and acceptance; searching for social support; sees family conflicts as opportunities; considers the parenting task as a personal construction. Negative role: emphasizes difficulties and problems, values the use of criticisms and warnings, presents family conflicts as negative, states parents made wrong decisions, proposes an ideal model of parenting. Scale 0-4 in each role: (0) none of these elements; (1) mentioned one element; (2) mentioned two elements; (3) mentioned three or four elements; (4) mentioned five elements.
4. Parenting practices	Refers to a variety of practices: assertive communication; negotiating a solution; time out; taking away privileges; token economy; scolding; emphasizing empathy; corporal punishment. (0) Absence; (1) Presence. Cumulative score (0-8).
5. Educational content	Offers content on: school homework; educational games; developmental stages; behavioural problems; family health; innovative pedagogy; pregnancy and childbirth; family nutrition. (0) Absence; (1) Presence. Cumulative score (0-8).
6. Multimedia use	Offers: videos; online games; news; animated scenes. (0) Absence; (1) Presence. Cumulative score (0-4).
7. Communication tools	Email; chat-rooms; online forums; Facebook; Twitter. (0) Absence; (1) Presence. Cumulative score (0-5).
8. Type of information	Uses the three types of information: a) experiential information (e.g., events, opinions); b) academic information (concepts, research findings); c) technical information (e.g., strategies, practices). Scale 0-4, (0) not at all to (4) very much.

(Bangdiwala, 2017; Cohen, 1960), the two raters started the evaluation of the websites in the sample. Inter-rater reliability (Kappa 0-1) for the ethical criteria was adequate: Authority 0.93; Privacy 0.72; Attribution 0.84; Justifiability 0.91; Transparency 0.88; Financial disclosure 0.86; and Advertising policy 0.88. Inter-rater reliability for the content criteria was adequate: Gender equality 0.91; Family diversity 0.93; Parental role 0.94; Parenting practices 0.88; Educational content 0.87; Multimedia use 0.88; Communication tools 0.83; and Type of information 0.88.

### 3. Analysis and results

For the first research question, chi-square analyses were used, crossing the characteristics of the sampled websites with each ethical criterion. We used the corrected typified residuals ( $r_z$ ) to further explore the statistically significant differences in the contingency tables (Haberman, 1973). This procedure allowed us to identify the particular cells in which the  $z$  scores were greater than  $+1.96$  (above chance levels) or less than  $-1.96$  (below chance levels). Cramer's  $v$  (Agresti, 1996) was used as an indicator of effect size (ES), and significant results with medium and high ES were reported.

For the second research question, a hierarchical cluster analysis was performed on the content criteria scores using Ward's (1963) method to examine whether it was possible to distinguish different profiles. All variables were standardized to  $z$  scores to prevent the different scales from influencing the results. One-way ANOVAs by cluster membership were performed with Scheffe post hoc comparisons to examine whether the profiles significantly differed in the content criteria. The statistic  $R^2$  (Cohen, 1988) was used as an indicator of ES. Finally, chi-square analyses were used, crossing the characteristics of the sampled websites and the ethical criteria with the three clusters.

### 3.1. Characteristics of the online parenting resources modulating ethical quality

On average, Authority was unknown in 9.47% of the sites; experts in education and psychology were the authors in 46.32%, followed by experts in other subjects (22.11%) and parents (22.11%). Information on Privacy and Attribution was present in 68% and 42.11% of the sites, respectively. Information on Justifiability and Transparency was absent in 42.11% and 26.32% of the sites, partially present in 47.37% and 38.95%, and present in full in 10.53% and 34.74%, respectively. Financial disclosure and Advertising policy details were absent in 36.84% and 49.47% of the sites, partially present in 18.95% and 38.95%, and present in full in 44.21% and 11.58%, respectively.

The origin, type of entity, and purpose of the websites modulated most ethical criteria. Concerning origin, websites from Spain, and South America, respected privacy ( $\chi^2(2)=9.26$ ,  $p<0.001$ ), provided evidence to justify claims ( $\chi^2(4)=12.68$ ,  $p<0.001$ ), and provided financial disclosure ( $\chi^2(4)=15.88$ ,  $p<0.001$ ). Concerning type of entity and authority (as ethical criteria), public agencies were more likely to have experts in education as authors. Companies were more likely to have experts in other subjects authoring content, and parents' websites were more likely to have parents as authors ( $\chi^2(12)=43.7$ ,  $p<0.001$ ). Public agencies were more likely to respect privacy, and parents' websites were less likely to do so ( $\chi^2(4)=11.22$ ,  $p<0.001$ ). Companies were more likely to provide financial disclosure, and parents' websites were less likely to do so ( $\chi^2(8)=29.42$ ,  $p<0.001$ ). Finally, regarding purpose and authority, information sites had experts in education as authors whereas interactive sites had parents as authors ( $\chi^2(3)=17.9$ ,  $p<0.001$ ). Information sites provided attribution to source data while interactive sites were less likely to do so ( $\chi^2(1)=9.71$ ,  $p<0.001$ ); they partially provided evidence to justify claims while interactive sites provided no evidence ( $\chi^2(2)=10.34$ ,  $p<0.001$ ), and they provided financial disclosure while interactive sites were less likely to do so ( $\chi^2(2)=12.57$ ,  $p<0.001$ ).

### 3.2. Identifying content criteria profiles

For the second research question, cluster analyses showed an adequate three-cluster solution, since the clusters were theoretically meaningful, evident in the dendrogram (a tree-structured graph used to visualize the result of a hierarchical clustering calculation), and represented the best possible balance between cluster size and differentiation. The hierarchical three-cluster solution was replicated using the iterative partitioning method, k-means ( $n=95$ ). Mean distances between centroids of clusters 1 and 2 were 2.405 and 3.528, respectively, whereas the main distance between clusters 2 and 3 was 2.435. The mean scores on the clustering variables are shown in Table 5. The clusters differed in all variables, except for communication tools.

Cluster 1, labeled High quality ( $n=33$ ), was characterized by gender equality, the use of a positive parental role as opposed to

the negative role, a great variety of positive and negative parenting practices under analysis, a relatively high variety of educational content, and of multimedia use, and a balanced presentation of experiential, academic and

technical information. Cluster 2 was labeled Medium quality ( $n=25$ ) and was characterized by medium levels of gender equality, relatively high levels of family diversity, medium use of the positive parental role, low use of the negative parental role, medium variety of parental practices and educational content, low multimedia use, low levels

	Quality clusters			F (2,92)	Effect size (ES)	Differences	
	1 High (n=33)	2 Medium (n=25)	3 Low (n=37)			Post hoc	
Gender equality	1.36	1.04	.46	12.57***	.21	1-3***	2-3*
Family diversity	.15	.80	.05	21.00***	.31	2-1***	2-3***
Positive parental role	2.82	1.96	.73	56.21***	.55	1-2*** 2-3***	1-3***
Negative parental role	1.21	1.40	2.14	6.34**	.12	3-1**	3-2*
Parenting practices	3.30	2.00	.73	34.01***	.42	1-2*** 2-3***	1-3***
Educational content	5.03	3.44	1.57	40.59***	.46	1-2*** 2-3***	1-3***
Multimedia use	1.79	.60	.81	21.58***	.31	1-2***	1-3***
Communication tools	2.48	2.20	2.11	.97	.02	---	---
Experiential information	.64	.08	.51	4.11*	.10	1-2*	
Academic information	2.48	2.80	1.54	12.35***	.21	1-3**	2-3***
Technical information	2.52	1.32	.97	17.71***	.27	1-2***	1-3***



of experiential information, high levels of academic information and medium levels of technical information. Cluster 3, Low quality (n=37), was characterized by a low level of gender equality, very low levels of family diversity, very low use of the positive parental role and high use of the negative parental role, a very low variety of parenting practices, very low levels of educational content, medium levels of multimedia use, high levels of experiential information, and low levels of academic and technical information.

### 3.3. Website characteristics and ethical criteria associated with cluster membership

Chi-square tests revealed that Origin was differentially distributed across the clusters ( $\chi^2(2)=7.77$ ,  $p<0.05$ ).

Websites from Spain were overrepresented in the High-quality cluster, whereas sites of South American origin were overrepresented in the Low-quality cluster. Type of entity differed by Cluster ( $\chi^2(8)=20.07$ ,  $p<0.01$ ). Companies were overrepresented in the High-quality cluster and parents' websites in the Low-quality cluster. Purpose differed by Cluster ( $\chi^2(2)=8.83$ ,  $p<0.01$ ). Information sites were overrepresented in Cluster 2 and interactive sites in Cluster 3. Finally, Figure 1 illustrates the relationship between ethical criteria and cluster distribution. Privacy, Justifiability and Financial disclosure significantly differed by Cluster ( $\chi^2(2)=12.45$ ,

$p<0.01$ ;  $\chi^2(4)=13.88$ ,  $p<0.01$ ;  $\chi^2(4)=20.77$ ,  $p<0.001$ , respectively). Websites scoring above chance in full Privacy and Financial disclosure were more likely to be found in the High and Medium quality clusters. Websites scoring above chance in full Justifiability were more likely to be found in the High-quality cluster. Websites scoring below chance in full Privacy, Justifiability and Financial disclosure were in the Low-quality cluster.

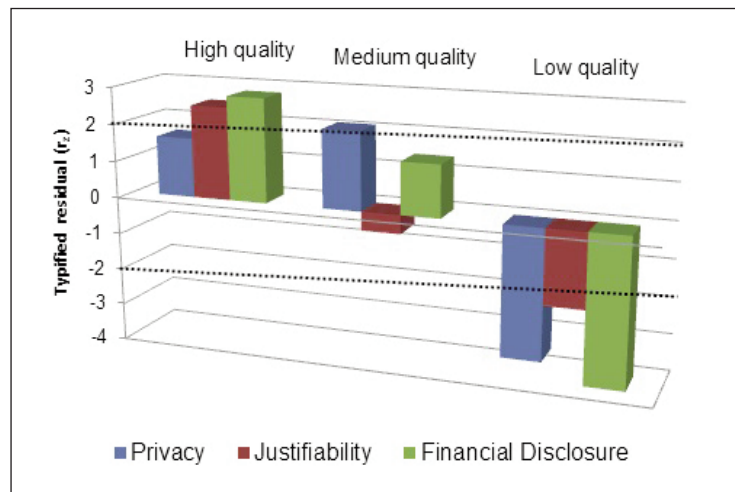


Figure 1. Significant corrected typified residuals (above and below the dotted line) for Privacy, Justifiability and Financial disclosure according to High, Medium and Low quality content profiles.

## 4. Discussion and conclusions

This study examined, for the first time, a set of ethical and content criteria based on the model of information adoption to be applied in the parenting domain. The results showed that the model used works well in guiding the selection of quality criteria for the evaluation purpose, which should be backed by further studies. Overall, the ethical quality varied according to the criteria. Authority, privacy, transparency and financial disclosure were more likely to be declared and practiced, whereas attribution to source data, justification of the claims based on scientific evidence and a clear advertising policy were practically absent in around half of the sites. The evidence-based movement in the parenting domain is not yet well established in Europe and is still in its infancy in many Spanish-speaking countries (Rodrigo & al., 2016). Therefore, parenting websites in Spanish face a major challenge to reflect this evaluation culture in the materials they offer. Likewise, commercial purposes are likely to be confounded with designers' genuine interest in supporting parents, which goes against a culture of respect for parents' rights as consumers.

As expected, the quality of ethical criteria also varied according to the origin, type of entity and purpose of websites. Higher quality was observed in websites from Spain as compared to those from South American countries, as measured by the privacy, justification and financial disclosure. Interestingly, lower Internet penetration rates in Colombia (56.9%), Argentina (69.2%) and Chile (77.8%) than in Spain (82.2%) seem to be accompanied by the designers' lower awareness of the importance of quality web-based parent support. Websites from North America had an intermediate position, probably because of they were clustered together for geographical proximity, but they show different penetration rates: USA (88.5%) and Mexico (45.1%). However, a more representative and ample

sample of websites from Spanish-speaking countries is needed before more solid conclusions can be reached.

The results for the type of entity and purpose also point to an ethical quality gap between public agencies and companies on the one side and parents' websites on the other. The use of experts, respect for privacy, attribution, justifiability and financial disclosure were typical of public agencies and companies and information sites, whereas parents' websites and interactive sites scored lower on all these ethical criteria. A possible explanation is that, in principle, parents are not expert designers and may not be aware of these ethical aspects. In fact, when doing their searches, parents seem to pay attention only to the authority and advertising policy, since they trust official websites and parental resources equally, whereas they give less credibility to commercial websites (Dworkin & al., 2013; Muñetón & al., 2015). Another potential explanation is that information carries value and credibility when it is delivered by friends or family in the context of a caring and trusting relationship or by those who share experiences and values similar to one's own (Ebata & Curtiss, 2017).

Using a person-centred approach, it was possible to distinguish three quality profiles for the websites, which differed meaningfully in two aspects: their view of families and the parenting task (Rodrigo & al., 2016), and the way they foster effective learning (Hughes & al., 2012; Myers-Walls & Dworkin, 2015). The High-quality websites valued gender equality, stressed a positive parental role, modeled a variety of parenting practices, included a variety of educational content and multimedia formats, and made use of experiential, academic and technical information. By contrast, the Low-quality websites provided a biased set of values (gender inequality and an undifferentiated view of the family), a focus on parental problems and single techniques, and a poor learning environment (little educational content, low multimedia use and an overreliance on parental experiences). Websites from Spain, sites run by companies and information sites were overrepresented in the High and Medium quality profiles, whereas sites from South America, parents' websites and interactive sites were mostly overrepresented in the Low-quality profile. These results showed that the benefits of using the Internet to exchange experiences with other parents and experts (Madge & d O'Connor, 2006; Niela-Vilén & al., 2014), might be put at risk by the comparatively lower ethical and content quality of these parenting resources.

Finally, as expected, we found a relationship between the ethical and content quality. It seems that protection of the visitor's rights to privacy and confidentiality, reliance on scientific evidence to back up claims or recommendations and fair disclosure of financial interests are important ethical qualities associated with a modern view of family and parenting, and efficient ways to foster the visitor's learning. This is especially true for the official/expert websites but not so much for the websites run by parents and interactive sites that tended to score lower on ethical criteria, as it is more difficult to ascertain the credibility of the source (like in eWOM communication, Cheung & al., 2008).

As a limitation, the selection of content criteria guided by the Council of Europe's Recommendation (19/2006) on positive parenting could not be universally accepted in other cultural contexts. The clustering of websites based on the geographical proximity should be refined in further studies using instead the penetration rates of the Internet in each country. Finally, the expert point of view taken in this study should be complemented with the professional and family perspectives to reach a complete consensus on the quality standards.

In conclusion, the Internet has become a crucial information and support source for parents, which provides an interesting example of open knowledge management in an informal educational context. It is in the parenting domain where the danger of exposing consumers to evidence-based contents, biased values, poor e-learning environments and hidden commercial purposes is presumably greater than informal educational contexts. Regrettably, the assessment of the quality of online parenting support and education is still an emerging field. Given the explosion of websites and blogs for parents, it is urgent to arrive at common definitions of ethical and content criteria for the assessment of online resources. Once reached a consensus, these criteria may provide guidelines for those designers who develop websites for parents. Our results showed that there is a large room for improvement both on the ethical and content aspects especially for interactive websites, those authored by parents and those with a South American origin. Professionals may also benefit by adopting quality standards since they also need to know which criteria to employ when judging the quality of Internet-based resources. In this way, professionals may decide on better grounds which websites and online materials should be used to support parents. They may also help parents to develop effective skills for browsing and search for trustworthy sources by themselves. The dissemination of the present results may also benefit parents as users of websites to autonomously scan information and decide whether it is credible, relevant or compelling enough to spend more time on it. To conclude, quality assurance of the websites should be at the forefront of the measures that should be taken for the effective use of informational technology in the parenting domain.

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## References

- Amichai-Hamburger, Y., McKenna, K.Y., & Tal, S.A. (2008). E-empowerment: Empowerment by the Internet. *Computers in Human Behavior*, 24(5), 1776-1789. <https://doi.org/10.1016/j.chb.2008.02.002>
- Bangdiwala, S.I. (2017). Graphical aids for visualizing and interpreting patterns in departures from agreement in ordinal categorical observer agreement data. *Journal of Biopharmaceutical Statistics*, 1-11. <https://doi.org/10.1080/10543406.2016.1273941>
- Baujard, V., Boyer, C., & Geissbühler, A. (2010). Evolution of Health Web certification, through the HONcode experience. *Swiss Medical Informatics*, 26(69), 53-55. (<https://goo.gl/RZp5Sg>).
- Bergman, L.R., Magnusson, D., & El-Khoury, B.M. (2003). *Studying individual development in an interindividual context: A person-oriented approach*. London: Psychology Press. (<https://goo.gl/qsXTD6>).
- Brady, E., & Guerin, S. (2010). Not the romantic, all happy, coochy coo experience: A qualitative analysis of interactions on an Irish parenting web site. *Family relations*, 59(1), 14-27. <https://doi.org/10.1111/j.1741-3729.2009.00582.x>
- Cheung, M.K., Lee, M.K.O., & Rabjohn, N. (2008). The impact of electronic word-of-mouth-The adoption of online opinions in online customer communities. *Internet Research*, 18(3), 229-247. <https://doi.org/10.1108/10662240810883290>
- Cohen, J. (1960). A coefficient for agreement for nominal scales. *Educational and Psychological Measurement*, 20, 37-46. <https://doi.org/10.1177/001316446002000104>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. New York: Lawrence Erlbaum, Hillsdale. (<https://goo.gl/yeqvLg>).
- Council of Europe (2006). *19 Recommendation of the Committee of Ministers to member States on policy to support positive parenting*. Strasbourg. (<https://goo.gl/Sk2BQG>).
- Dworkin, J., Connell, J., & Doty, J. (2013). A literature review of parents' online behaviour. *Cyberpsychology: Journal of Psychosocial Research on Cyberspace*, 7(2), 1-12. <https://doi.org/10.5817/CP2013-2-2>
- Ebata, A., & Curtiss, S.L. (2017). Family life education on the technological frontier. In S.F. Duncan & H.S. Goddard (Eds.), *Family life education: Principles and practices for effective outreach* (pp. 236-626). Thousand Oaks, CA: Sage. (<https://goo.gl/5PtQq3>).
- García-Peñalvo, F. J., García-de-Figuerola, C., & Merlo-Vega, J.A. (2010). Open knowledge: Challenges and facts. *Online Information Review*, 34(4), 520-539. <https://doi.org/10.1108/14684521011072963>
- Haberman, S.J. (1973). The analysis of residuals in cross-classified tables. *Biometrics*, 29(1), 205-220. <https://doi.org/10.2307/2529686>
- Healthonnet.org (2017). Health on the Net (HON): *HonCode: Principios en español*. (<https://goo.gl/eP73wT>).
- Hughes, R., Bowers, J.R., Mitchell, E.T., Curtiss, S., & Ebata, A.T. (2012). Developing online family life prevention and education programs. *Family Relations*, 61(5), 711-727. <https://doi.org/10.1111/j.1741-3729.2012.00737.x>
- Internet Live Stats (2016). *Internet Users by country*. (<https://goo.gl/1xiZfR>).
- Madge, C., & O'Connor, H. (2006). Parenting gone wired: Empowerment of new mothers on the Internet? *Social & Cultural Geography*, 7(2), 199-220. <https://doi.org/10.1080/14649360600600528>
- McDaniel, B.T., Coyne, S.M., & Holmes, E.K. (2012). New mothers and media use: Associations between blogging, social networking, and maternal well-being. *Maternal and Child Health Journal*, 16(7), 1509-1517. <https://doi.org/10.1007/s10995-011-0918-2>
- Muñeton M., Suárez, A., & Rodrigo, M.J. (2015). El uso de recursos web como apoyo a la educación de los hijos en los padres colombianos. *Investigación & Desarrollo*, 23(1), 91-116. <https://doi.org/10.14482/indes.23.1.6496>
- Myers-Walls, J.A., & Dworkin, J. (2016). Parenting education without borders. Web-based outreach. In J.J. Ponzetti (Ed.), *Evidence-based Parenting Education. A global perspective* (pp. 123-139). New York: Routledge. (<https://goo.gl/HC2TXm>).
- Niela-Vilén, H., Axelín, A., Salanterä, S., & Melender, H.L. (2014). Internet-based peer support for parents: a systematic integrative review. *International Journal of Nursing Studies*, 51(11), 1524-1537. <https://doi.org/10.1016/j.ijnurstu.2014.06.009>
- Nieuwboer, C.C., Fukkink, R.G., & Hermans, J.M. (2013a). Peer and professional parenting support on the Internet: a systematic review. *Cyberpsychology, Behavioral and Social Networks*, 16(7), 518-528. <https://doi.org/10.1089/cyber.2012.0547>
- Nieuwboer, C.C., Fukkink, R.G., & Hermans, J.M. (2013b). Online programs as tools to improve parenting: a meta-analytic review. *Children and Youth Services Review*, 35(11), 1823-1829. <https://doi.org/10.1016/j.chilyouth.2013.08.008>
- Rodrigo, M.J., Máiquez, M.L., Martín, J.C., & Rodríguez, B. (2015). La parentalidad positiva desde la prevención y la promoción. In M.J. Rodrigo, M.L. Máiquez, J.C. Martín, S. Byrne, & B. Rodríguez (Eds.), *Manual práctico en parentalidad positiva* (pp. 25-44). Madrid: Síntesis. (<https://goo.gl/RpHwpB>).
- Rodrigo, M.J., Almeida, A., & Reichle, B. (2016). Evidence-based parent education programs: A European perspective. In J. Ponzetti (Ed.), *Evidence-based parenting education: A global perspective* (pp. 85-104). New York: Routledge. (<https://goo.gl/HC2TXm>).
- Rodrigo, M.J., Byrne, S., & Álvarez, M., (2016). Interventions to promote positive parenting in Spain. In M. Israelashvili, & J.L. Romano (Eds.), *Cambridge handbook of international prevention science* (pp. 929-956). Cambridge, UK: Cambridge University Press. (<https://goo.gl/nrYhEk>).
- Rothbaum, F., Martland, N., & Janssen, J.B. (2008). Parents' reliance on the web to find information about children and families: Socio-economic differences in use, skills and satisfaction. *Journal of Applied Developmental Psychology*, 29(2), 118-128. <https://doi.org/10.1016/j.appdev.2007.12.002>
- Sarkadi, A., & Bremberg, S. (2005). Socially unbiased parenting support on the Internet: a cross sectional study of users of a large Swedish parenting website. *Child: Care, Health and Development*, 31(1), 43-52. <https://doi.org/10.1111/j.1365-2214.2005.00475.x>
- Suárez, A., Rodrigo, M.J., & Muñeton, M. (2016). Parental activities seeking online parenting support: Is there a digital skill divide? *Revista de Cercetare si Interventie Sociala*, 54, 36-54. (<https://goo.gl/H5yCxb>).

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# Participatory design of citizen science experiments

Diseño participativo de experimentos de ciencia ciudadana

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## ABSTRACT

This article describes and analyzes the collaborative design of a citizen science research project through co-creation. Three groups of secondary school students and a team of scientists conceived three experiments on human behavior and social capital in urban and public spaces. The study goal is to address how interdisciplinary work and attention to social concerns and needs, as well as the collective construction of research questions, can be integrated into scientific research. The 95 students participating in the project answered a survey to evaluate their perception about the dynamics and tools used in the co-creation process of each experiment, and the five scientists responded to a semi-structured interview. The results from the survey and interviews demonstrate how citizen science can achieve a “co-created” modality beyond the usual “contributory” paradigm, which usually only involves the public or amateurs in data collection stages. This type of more collaborative science was made possible by the adaptation of materials and facilitation mechanisms, as well as the promotion of key aspects in research such as trust, creativity and transparency. The results also point to the possibility of adopting similar co-design strategies in other contexts of scientific collaboration and collaborative knowledge generation.

## RESUMEN

Este artículo describe y analiza el diseño colaborativo de un proyecto de investigación de ciencia ciudadana a través de la co-creación. Tres grupos de estudiantes de centros de educación secundaria y un equipo de científicos idearon de forma participada tres experimentos sobre comportamiento humano y capital social en espacios públicos y urbanos. El objetivo del estudio es abordar cómo pueden integrarse en una investigación científica el trabajo interdisciplinar y la atención a preocupaciones y necesidades sociales, así como la construcción colectiva de preguntas de investigación. Los 95 estudiantes participantes en el proyecto respondieron una encuesta para evaluar su percepción sobre las dinámicas y herramientas utilizadas en el proceso de co-creación de cada experimento, y los cinco científicos respondieron a una entrevista semi-estructurada. Los resultados de las encuestas y entrevistas demuestran cómo la ciencia ciudadana puede alcanzar una modalidad «co-creada» más allá del paradigma habitual «contributivo», el cual únicamente suele implicar al público o amateurs en la recopilación de datos. Esta modalidad de ciencia más colaborativa con la ciudadanía fue posible gracias a la adecuación de materiales y mecanismos de facilitación, así como al fomento de aspectos clave en una investigación como pueden ser la confianza, la creatividad y la transparencia. Los resultados apuntan también hacia la posibilidad de adoptar estrategias similares de co-diseño en otros contextos de colaboración científica y generación colaborativa de conocimiento.

## KEYWORDS | PALABRAS CLAVE

Citizen science, co-creation, co-design, knowledge, toolkit, interdisciplinarity, participation, open science.

Ciencia ciudadana, co-creación, co-diseño, conocimiento, herramientas, interdisciplinariedad, participación, ciencia abierta.



## 1. The study goal and aim of the analysis

Citizen science represents a participatory research model that involves the public in scientific projects (Irwin, 1995; Hand, 2010; Gura, 2013), usually in data collection (Cohn, 2008) and, in some cases, in the collective interpretation of results (Delfanti, 2016). In the last decade, citizen science has received greater attention and acknowledgement in the academic literature (Follet & Strezov, 2015), in its development mainly in the natural and experimental sciences (Ferran-Ferrer, 2015), and it has transformed investigative methods applied in these fields (Wylie & al., 2014). The normal citizen science model considers collaboration between scientists and “amateur” participants as mere “contributory systems” (Wiggins & Crowston, 2015). Nevertheless, there is a growing number of cases involving greater collaboration on the part of the population at various stages of an investigation (Shirk & al., 2012; Delfanti, 2016), as also occurs in other collective knowledge-generation processes that adopt an open and innovative perspective (Yáñez-Figueroa & al., 2016). Follet and Strezov (2015) define citizen science projects according to the type of voluntary participation:

- Contributory projects: participants take part in data gathering, analyze the data at certain points in the project and help disseminate the results.
- Collaborative projects: as well as the above, the participants analyze samples and, on occasions, help designs the study, interpret data, draw conclusions or disseminate the results.
- Co-created projects: the participants collaborate in all stages of the project, including the definition of the questions, development of hypotheses, discussion of results and response to further questions that might arise.

Authors such as Bonney and others (2009a) point to the need to go beyond the contributory model of citizen science and involve the volunteer in the design process of the research in ways that are more deliberative and accessible. However, compared to the academic literature and resources generated around the contributory and collaborative modalities of citizen science, in the form of guides (Tweddle & al., 2012) or material for facilitation of this process (Bonney & al., 2009b), there is currently very little detailed information on the mechanisms used for the deliberate design of a co-created model of citizen science.

Apart from some pioneering experiences in techno-scientific participation, such as Public Lab (Wylie & al., 2014), conceptual frameworks for public involvement in scientific research (Shirk & al., 2012) and methodologies based on logical models for citizen participation (W.K. Kellogg Foundation, 2004), as opposed to other co-created knowledge-generation settings (Manzini & Coad, 2015) there are few practical resources available to facilitate the co-designing of research process; the exception is urban cartography experiences (Mindell & al., 2017).

This study analyzes how co-design can contribute to the idea that science can be made in collaboration with society. In our study, co-design is defined from an understanding of the co-created modality of citizen science as “participatory science” or “civic science” (Wylie & al., 2014), which encourages the appropriation of both the means that make it possible, and the knowledge generated as a result of a collective investigation. This approach connects with methodological and pragmatic challenges to develop a “co-production framework” or “language of co-production” in research, following the formulations of Jasanoff (2004), and what she terms the “participatory turn” in scientific studies (2003).

With this in mind, this study analyzes the co-design process in three collective experiments of citizen science directed by a team of scientists with experience in co-facilitating and analysing similar experiments in the public space (Sagarra & al., 2016) using collaborative and contributory modalities (Perelló & al., 2017). The case study, whose sequence is described in detail in the third section of this article, is based on an important conceptual difference in design thinking between “co-creation” (the generic process of collective creativity) and “co-design” (a set of specific participatory design techniques), the latter being a specific feature within the broader co-creation setting (Sanders & Stappers, 2008).

Our analysis addresses the following research questions:

- Can co-creation contribute to a more collaborative form of citizen science?
- How can science integrate social needs and concerns in its design and communication dynamics?
- How can interdisciplinary work be coordinated to construct knowledge collaboratively?
- How has knowledge been developed in this citizen science co-creation experience?

## 2. Methodology of the study

The case under analysis is part of the STEMForYouth (stem4youth.eu) initiative, an European project of the Horizon 2020 programme that aims to encourage young people to study science and technology at the university.

Co-creation experiences were organized to design citizen science experiments with three groups of teenagers (95 in total) attending secondary schools in the Barcelona area (Spain) that covered a range of socio-demographic contexts.

To ensure that the research project was truly participatory and co-creative, the participants were involved at the start, from the design phase of the investigation. The co-design process of the experiments, based on a set of materials from a toolkit developed for the task, included collective agreement on the definition of the subject matter, the aims of the research and the research questions, and even the methods and logistics required to carry out the field work<sup>1</sup>.

This article evaluates this co-created design phase of the investigation, for which a survey and interviews were used to address the research questions posed in the study. These two methods were chosen for the exploratory nature of our study in this relatively novel framework of citizen science, following the example of other advances in this field (Bela & al., 2016). The key aspects covered by the questionnaire and interviews derive from a review of the literature on citizen science (Shirk & al., 2012) and on co-design processes (Sanders & Stappers, 2008), as shown in Table 1.

**Table 1. Research questions and key concepts in citizen science and co-design**

Research questions	Key related concepts	Citizen science (Shirk & al., 2012)	Co-design (Sanders & Stappers, 2008)	Survey question number	Discussed in interviews
Can co-creation contribute to a more collaborative form of citizen science?	Motivation	X	X	Q11	X
	Generation of options (divergence)		X	Q8	X
	Quality of results	X		Q5	X
How can science integrate social needs and concerns in its design and communication dynamics?	Involvement	X		Q1	X
	Trust and credibility	X		Q6	X
How can interdisciplinary work be coordinated to construct knowledge collaboratively?	Coherent sequencing	X	X	Q7	X
	Facilitation roles		X	Q4	X
How has knowledge been developed in this citizen science co-creation experience?	Quality of participation	X		Q10	X
	Decision taking (convergence)		X	Q9	X
	Power relations	X		Q3	X

### 2.1. Survey to participating students

Following the co-design sessions for each of the three citizen science projects, an anonymous online questionnaire was sent to all the students who took part (a universe of 95 individuals aged 13 to 17 with an equal gender mix, of whom 79 responded to all the questions (81.4%).

### 2.2. Interviews with the team of scientifics

Five semi-structured interviews were carried out with all the members of the research team, to support the survey data with an analysis of their perceptions of the interaction that took place during the co-design process. A content analysis of the interviews was made based on the categories presented in Table 1.

The researchers interviewed were: MC, the main researcher, male, aged 42; RS, researcher and project manager, female, 41; AC, researcher in training, female, 27; AF, researcher in training, male, 24; CP, researcher and designer, female, 32

Codification was done by two other researchers: one who had conducted the interviews (in this case, also acting as a facilitator of the co-design sessions), and another one who had not participated in the interviews or in the co-design process. Later, each category was tested for reliability to check the level of agreement between the two codifiers. In this study, the overall reliability (0.86) was higher than the indices recommended by Krippendorff (1990) and greater than the 0.80 (alpha) that enables solid and fundamental conclusions to be drawn beyond mere speculation.

### 3. Description of the co-design process

A “design thinking” dynamic was used to achieve a co-created research design, in which interaction sequences between the different groups of participants were developed. The only premise for initiating the sessions was to

describe a previous example of a citizen science experiment in a public space, as well as to focus the new experiment on an aspect of human behaviour.

A series of sessions took place in the three secondary school settings, with some slight variations and adaptations between each, which dealt with the co-designing for each experiment in four stages: (a) the problem to be addressed, (b) research questions, (c) conceptual diagram and (d) planning the tasks for executing the experiment (Table 2). There were 12 sessions in total, each lasting between one and two hours.

A toolkit was developed for use in the majority of the knowledge-generation dynamics. This key material<sup>2</sup> was tested in preliminary versions and discussions during its use by the research team, to get a balance between usability and rigor, with the aim of producing a useful co-design toolkit for the collective generation of knowledge within a citizen science framework.

During the four stages, the use of the toolkit was guided by the research team acting as co-facilitators, to connect

concepts and clarify doubts, while the main facilitator provided a framework for the work in order to achieve some informal yet specific ways to generate and present visual information, in accordance with participatory design practices (Kensing & Blomberg, 1998).

The aim of each session was to perform a divergence and convergence sequence (Brown & Katz, 2011). That is, to generate ideas and possibilities in a participatory way (a sequence of divergence: normally done by forming sub-groups)

**Co-creation, adopting visual material and participatory design techniques that allow the generation and selection of ideas that provide quality results for a science that is more open to citizens, and which is more collaborative. In particular, co-creation is perceived as a fundamental factor in participants' motivation and commitment, a key aspect in citizen science projects.**

and a later coming-together to select options (convergence sequence): through idea-sharing and decision-taking mechanisms.

- Stage A: Identifying the collective problem to be addressed. Initially, to stimulate the use of a range of skills within each working subgroup (formed of 6-8 participants), it was proposed that the students select a badge to identify a role they wished to adopt from a set of investigator roles and profiles. Later, the students were invited to brainstorm types of problems for which an experiment on human behaviour could generate evidence of requiring actions to be taken for the improvement of a neighbourhood or city. The parameters used to reach a consensus within each group-class were concepts like the "viability" of the experiment, the "social impact" of the results or the "motivation" necessary to carry it out. Students' opinions were posted on the walls and compared using thermometers.

- Stage B: Generation of research questions. For the co-creation of specific research questions, each subgroup used a template on which they could stick Post-its enabling them to complete at least three questions that started: What would happen if...? What is the relation between? How...? In this cooperative way, they completed pre-defined syntagms that, in modular form, contained the different research question options: descriptive, comparative and relational (Onwuegbuzie & Leech, 2006). Later, a moment of convergence based on discussion and the visual selection of the best options helped to filter the most relevant research questions for the group as a whole.

- Stage C: Conceptual diagram of the experiment. The third co-design stage took the research questions selected by each group to a more exploratory and creative level, linking a sequence of concepts around the experiment like action flows through a chronogram. This dynamic followed the premise that the investigation should be designed collectively from its initial steps to ensure the commitment and alignment of all those involved (Barnes & al., 2006). The participants chose icons from a wide range of images that reflected the key aspects of a potential experiment: research methods; logistics; key concepts or variables; participants; and other elements to visualize. These "dense diagrams" reopened debate and conversation about viability and motivation, and helped in the selection of an experiment co-design from among the various "finalists".



• Stage D: Task planning and logistics. Based on the final selection of objectives and sequences (one related to perceptions of public space and infrastructure in the city, another to gender and discrimination, and a third experiment concept centered on inequality and immigration), each session aimed to move on from the co-design paradigm to preliminary planning. Here the participants dealt with the logistics and tasks required to execute each experiment, in this way ensuring scientific rigor by gathering data and obtaining relevant results for all the agents involved. In this instance, the toolkit provided a surface divided into columns like a basic “kanban” table, which made tasks that might have gone unnoticed both agile and explicit (Hines & al., 2004).

Each column focused on a category of tasks derived from the icons used in the prototype selected, in which the participants brainstormed ideas that they considered appropriate for an experiment (the performance of which, following the earlier participatory stages are seen in Table 2, took place in various public spaces).

<b>Table 2. The co-design stages of the experiments</b>	
(Divergence sequence)	>> (Convergence sequence)
<b>Stage A: Definition of the problem to be addressed</b>	
Presentation + Accreditation of the participants according to roles and aptitudes	
Brainstorming ideas on themes that concern participants on a local level	>> Grouping, discussion and selection based on thermometers of concepts (social impact, viability, motivation)
<b>Stage B: Generation of research questions</b>	
Structured formulation of questions according to models: descriptive, comparative or relational	>> Subgroups vote on questions to be selected, idea sharing and grouping of questions
<b>Stage C: Conceptual diagram of the experiment</b>	
Prototyped / chronogram of experiment steps: key concepts, timing and methods to be used	>> Presentation by each group and discussion prior to individual voting
<b>Stage D: Planning tasks and logistics</b>	
Brainstorming ideas on tasks, logistics, dissemination and definition of the experiment	>> Idea sharing and subsequent processing in order to perform the experiment
Later stages: Assigning tasks to each group > Production of digital tool and placing the experiment in its setting > Gathering the data > Results analysis > Dissemination and publication in academic outlets	

## 4. Results

We present the main results of the study based on the student survey and interviews with the team of scientists. These results link the research questions to the theoretical fundamentals and key concepts of citizen science and co-design (Table 1) following the co-design sequence in the four stages previously described (Table 2).

### 4.1. Can co-creation contribute to a more collaborative form of citizen science?

The researchers were convinced that student participation in the design of the experiment was vital from the first moment. In the interviews, they were critic with the role of the expert in citizen science (RS, MC) and expressed a desire “to make science truly participatory” (LD). They were initially concerned about whether the subject chosen by the participants would belong to a setting in which they, as researchers, were sufficiently experienced (RS).

Before beginning the co-design process, the researchers’ intention to boost the participation of other actors in the design of the investigation had given rise to doubts: drawing up research questions in collaborative fashion (RS) could be a more complex process than letting the researchers do it themselves (RS, LD); the complexity of not knowing how a co-creation experience could evolve and end (LD); the casuistry of the schools and the populations, which could at times make managing the activity more complex (MC, LD). However, after various co-design stages had been completed, there was a consensus that the initial expectations had been more than satisfied (RS, CP, MC), and that motivation was considerably higher when the non-expert was involved from the beginning (AF, LD). The high level of motivation and commitment achieved through co-creation is also reflected in the responses of the 79 participants to the survey (Figure 1, question Q11), and clearly connects with the scientists’ assessments, such as the “engagement of the citizens with citizen science projects is key for ensuring the success and sustainability of the projects” (RS).

The contribution to the research of the visual material in the co-design toolkit was also analyzed. The material was adapted to the needs of each phase of discussion (MC, CP), and fulfilled the main objective to provide a common language (LD) that reflected ideas that would later be selected (AF, RS). The material was considered essential by 49% of the student participant in conceiving the experiments, and 35% thought it was relevant for enabling the acquisition of new knowledge; 15% found it quite useful and 0% thought it was of no use (Q8).

In terms of the quality of the results, the interviewees stated that the investigation had been democratized (AF, CP) and it yielded perspectives that had not been considered before (RS), including unforeseen circumstances: “the students took a critical stance on many occasions, more than I expected” (LD). The participants expressed satisfaction with the scope of the definition of the experiment design (Figure 1, question Q5), and declared that the experience had been enriching, while also emphasizing (compared to other forms of research design) the challenge to maintain this spirit of co-creation and transparency alive in the following collaborative phases of production, execution and analysis of results (RS, LD, MC).

Despite discrepancies regarding the extent of definition in some of the final conceptual maps (CP, AF), or on the level of detail in the tasks to be undertaken that were identified collectively (MC), the interviews reveal that the co-designing done with the students produced themes, research questions and experiment preparation that were useful (LD) and, in some cases, contained a level of detail that was unexpected (RS).

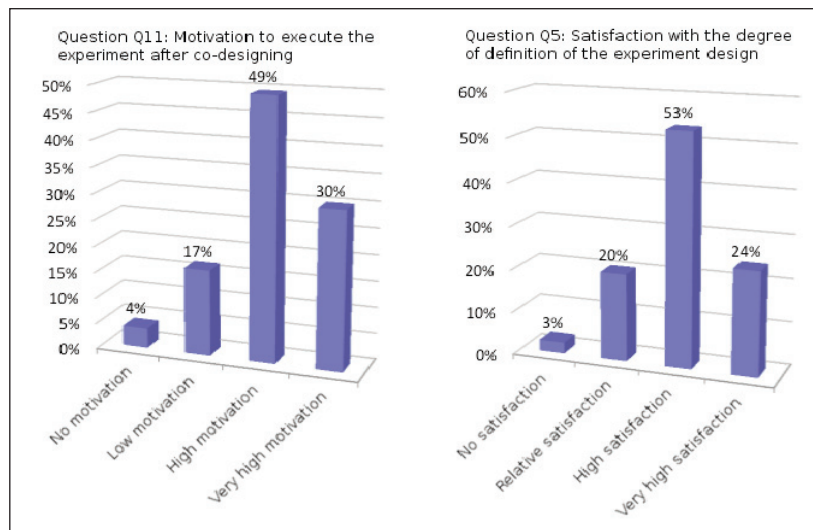


Figure 1. Motivation to execute the experiment and satisfaction with the experiment co-design.

#### 4.2. How can science integrate social needs and concerns in its design and communication dynamics?

The interviews with the research group show that the collaborative method described helped integrate the participants' local concerns into the investigation (RS, LD, CP). For example, RS stated that “the design process arose when the themes were decided and a genuine concern emerged; the connection with local problems has been very clear”.

In the survey, most students agreed that they had been able to get involved by expressing their personal points of view (Figure 2, question Q1). The interviews also reveal that the level of involvement, when dealing with a subject close to their concerns and interests, increased student commitment to carrying out the experiment (RS, LD, AF). The students acknowledged the usefulness of the toolkit in discussing and contrasting their concerns (RS, CP), and how the result of the dynamics established to delimit the subjects of the experiments “was closely related to the way in which the participants perceive society and the problems of their surroundings” (CP).

The generation of an environment of credibility and mutual confidence was considered essential for the various stages of co-creation (CP, MC), since the dynamizing agent and the scientists could have been perceived as intruders in the classroom, which could have diminished motivation and contributions. The survey showed (Figure 2, question Q6) that the majority of students had no problem in freely expressing their opinions and only a few felt insecure.

#### 4.3. How can interdisciplinary work be coordinated to construct knowledge collaboratively?

Various interviewees considered that interdisciplinary work and the collaborative production of knowledge can be facilitated thanks to this type of co-design: “each can take a step back from their individual discipline and establish peer-to-peer dialogues” (RS), “many people with different viewpoints have generated knowledge together, beyond one single disciplinary field” (LD). In addition, sharing ideas was highly rated by the researchers after each session

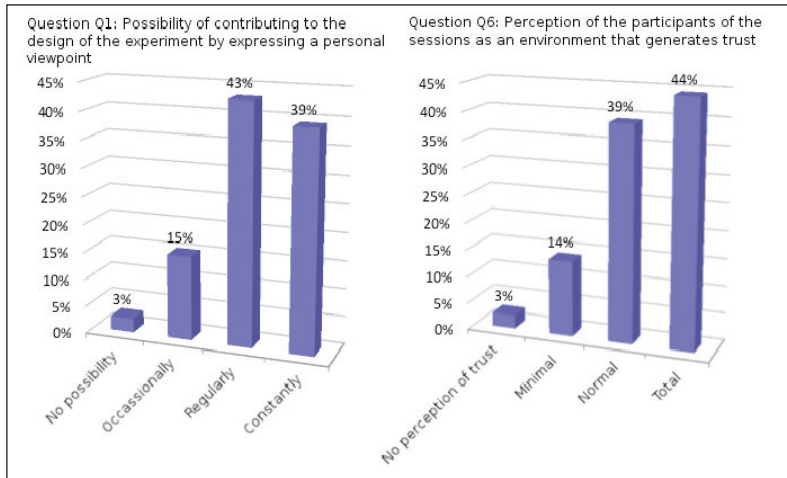


Figure 2. Students' perception of their integration in the co-design process.

occurred in specific groups (RS) or making initial presentations to help students contextualize the investigation (MC). It is also relevant that the students did not appreciate any difference in the influence of the figure of the main dynamizing agent and that of the co-facilitators of the research group (Figure 3, question Q4). This understanding also underlines the interdisciplinary question and the importance of combining scientific knowledge and specific facilitation skills for co-creation.

The research team mainly agreed that these co-creation techniques can be transferred to any scientific project design (RS, LD) and can help to channel scientific discussion (AF); however, most recognize the need for some experience and competence in conducting the co-creation dynamics in citizen science. "In the end, it is a question of finding a balance between democratizing science and the experience of the scientists" (AF), and that in terms of interdisciplinary work, "the researchers did not establish a knowledge hierarchy over the students" (LD).

#### 4.4. How has knowledge been developed in this citizen science co-creation experience?

The collaborative development of knowledge was based on the crucial participation of the students. RS describes the process as a design "validated by the participants themselves". In the relation between the team of scientists and the students, the former describe this experience as an adaptive process (RS, CP) that is highly flexible (LD) and eminently cyclical: "when you begin the sessions, you realize that is not such a good idea to be so linear; and if you allow them a certain amount of freedom and open up options, then new things can be introduced at the last minute. Allowing for some room for manoeuvre is a good idea" (MC).

Regarding the materials, the scientific team considered that the combination of toolkit activities and their facilitation "generated debate and dialogue by integrating diversity through co-design, gathering different opinions and introducing them into the discussion and moments

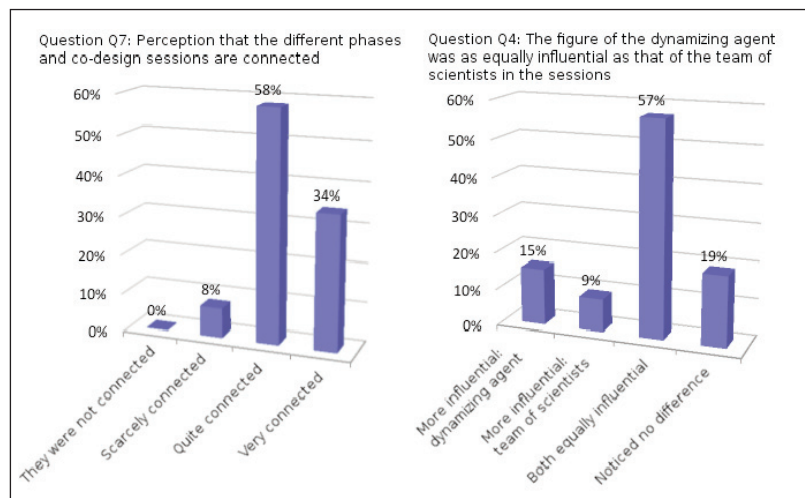


Figure 3. Valuation of the sequencing and facilitating in the sessions.

of reflection” (CP). This observation connects with the result in the survey for the question related to the quality of the participation: a clear majority of students agreed that the process allowed them moments for discussion and debate (Figure 4, question Q10).

Despite the fact that some interviewees referred to the complexity of carrying out collective decisions and of managing this requirement within the time limits of each session, which were perceived as very intense (RS, MC, AF), involvement with the co-facilitation dynamics and the associated toolkit materials meant that the entire process was more open (RS); another achievement was a “visualization of difficult concepts” (LD) and, in general terms, the necessary adaptation of the materials and mechanisms in order for decisions to be taken (AF, CP), which again was acknowledged in the survey (Figure 4, question Q9).

With the team of scientists agreeing that the following stages of the investigation required further processing of the co-design results (RS, MC, LD), another key aspect to emphasize is the recognition that the design of the experiment, as was intended, faithfully reflected the work performed by all the participants at all times, with no single influence prevailing at any time, with the team of scientists declining to adopt a position of power (LD, CP, AF). This perception was supported by the result in the survey (question Q3) in which 77% of those polled stated that the design of the experiment reflected the work carried out by all the participants in the work sessions with the team of scientists, against 23% who declared that the design was very much influenced by the team (and 0% who said the results were only the work of the scientific team). This connects to the recurring question of the degree of influence exerted by the experts during the sessions, about which CP states: the themes discussed were not influenced by the scientific team, which is very positive as the students could feel part of the process”.

Finally, another aspect that stands out was the team of scientists’ generalized perception that the co-design techniques applied here could be transferred to other forms of citizen science (RS, MC, LD) and even to other types of scientific research projects (RS, CP). In this sense, the co-design of the experiments can be understood as another experiment in itself, in this case one of participation and consensus generation (MC), and as a good initiation experience in the co-created model of citizen science (RS, LD) whose results enable an exploration of even greater levels of participation in the collaborative design of an investigation (CP).

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## 5. Discussion and conclusions

By describing the process and analysing the results of this case study, we have tried to address the question of how collaboration in citizen science can be strengthened by co-created designs for investigation, attending to a wide range of interests and joining social and scientific objectives (Bonney & al., 2014). We describe the mechanisms that enable clear and specific objectives to be fixed for each experiment, identifying various possibilities by iterative design processes (Dickinson & al., 2012). For example, we describe how the research questions can be formulated as a process driven by the participants themselves, instead of the usual top-down schema dictated by the expert scientist (Newman & al., 2012).

The data obtained from the research questions enable us to draw the following conclusions:

- Co-creation, adopting visual material and participatory design techniques that allow the generation and selection of ideas provide quality results for a science that is more open to citizens, and which is more collaborative. In particular, co-creation is perceived as a fundamental factor in participants’ motivation and commitment, a key aspect in citizen science projects.

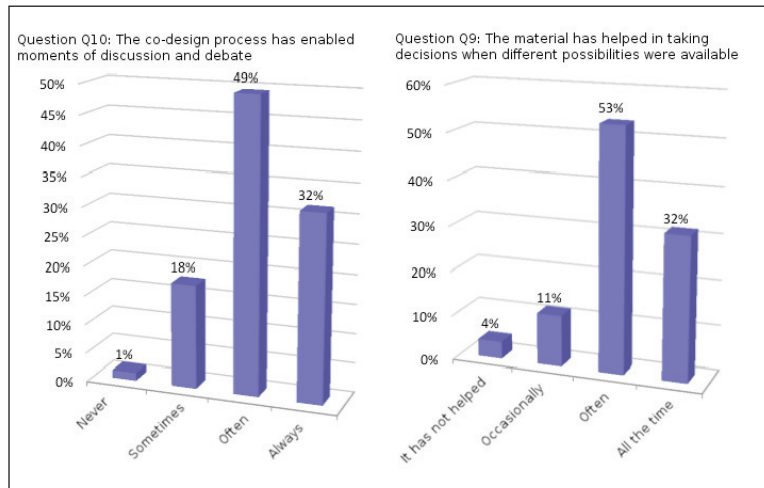


Figure 4. Keys for the development of knowledge during the co-design.

- Citizen science can integrate social needs and concerns into its design and communication dynamics if, at the start of the co-creation process, it can generate the actors' trust in the process. Initiating the mechanisms for decision taking preliminary to any investigation is valued by the participants as an important aspect of successful integration.
- Good coordination of interdisciplinary work is very important for achieving good collaborative generation of knowledge. In this context, coordination requires coherent sequencing of the various co-design phases in which scientific experts fully integrate their expertise with roles of facilitation of group dynamics.
- A key question is a good balance relations of power during the entire process, ceding the initiative to the amateur participants in a structured way while retaining the role of scientific expert, but as guide and reference point at key moments, using as support mechanisms and material that generate reflection and debate.

The results suggest that the toolkit functioned well as a support of design techniques to integrate the diversity of viewpoints and opinions in visual form (Brown & Wyatt, 2015). As both the survey and interviews reveal, this material also encourages interdisciplinarity and can channel co-creation onto a structured visual canvas, something that, despite exceptions (Nagle & Sammon, 2016), constitutes an innovative contribution this study to the design of research processes.

Among the limitations and the need for greater analysis of this type of co-creation developed in this citizen science experience, it is important to mention complications arising from time management in the development of co-design by phases. A recurring comment in the interviews was the complexity of managing each session compared to traditional research design processes, in particular satisfactorily combining the moments when ideas are generated with collective decision taking. Also, certain deficiencies were detected in some co-design sequences during analysis such as in the initial identification of roles (not adequately applied when forming groups), or in the final phases in which the interface and protocol of the experiments were defined in greater detail. Future research that analyzes similar co-creation dynamics in the design of the investigation, whether in the citizen science environment or other settings involving public participation in knowledge, should consider these aspects when planning the development of co-design activities.

As well as the key questions posed at the start of this study, the responses of the team of scientists also suggest that this type of co-design can be extrapolated to scientific and academic interdisciplinary settings where the general public, the non-expert or so-called amateurs are absent from a terrain occupied by experts from various fields. In other words, the possibility of adopting similar co-creation dynamics for the design of research projects in professional teams with different scientific challenges.

## Notes

<sup>1</sup> It is important to underline that the analysis centers on the initial phase of the co-creation of these citizen science experiments, before the following phases of organization and subsequent execution of each of the experiments, which also count on direct student involvement.

<sup>2</sup> The version of the toolkit used is available for consultation online or use by third parties, to promote the reproduction of the co-designing processes of experiments: <https://goo.gl/xoU8vJ>.

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## References




- Barnes, T.A., Pashby, I.R., & Gibbons, A.M. (2006). Managing collaborative R&D projects development of a practical management tool. *International Journal of Project Management*, 24(5), 395-404. <https://doi.org/10.1016/j.ijproman.2006.03.003>
- Bela, G., Peltola, T., Young, J. C., Balázs, B., Arpin, I., Pataki, G., ... & Keune, H. (2016). Learning and the transformative potential of citizen science. *Conservation Biology*, 30(5), 990-999. <https://doi.org/10.1111/cobi.12762>
- Bonney, R., Ballard, H., Jordan, R., McCallie, E., Phillips, T., Shirk, J., & Wilderman, C.C. (2009a). *Public Participation in scientific research: Defining the field and assessing its potential for informal science education. A CAISE Inquiry Group Report*. Online Submission. (<https://goo.gl/wsZYQn>)
- Bonney, R., Cooper, C.B., Dickinson, J., Kelling, S., Phillips, T., Rosenberg, K.V., & Shirk, J. (2009b). Citizen science: a developing tool for expanding science knowledge and scientific literacy. *BioScience*, 59(11), 977-984. <https://doi.org/10.1525/bio.2009.59.11.9>
- Bonney, R., Shirk, J.L., Phillips, T.B., Wiggins, A., Ballard, H.L., Miller-Rushing, A.J., & Parrish, J.K. (2014). Next steps for citizen science. *Science*, 343(6178), 1436-1437. <https://doi.org/10.1126/science.1251554>
- Brown, T., & Katz, B. (2011). Change by design. *Journal of Product Innovation Management*, 28(3), 381-383.

- <https://doi.org/10.1111/j.1540-5885.2011.00806>
- Brown, T., & Wyatt, J. (2015). Design thinking for social innovation. *Annual Review of Policy Design*, 3(1), 1-10. (<https://goo.gl/1pguci>)
- Cohn, J.P. (2008). Citizen science: Can volunteers do real research? *BioScience*, 58(3), 192-197. <https://doi.org/10.1641/B580303>
- Delfanti, A. (2016). Users and peers. From citizen science to P2P science. *Cell*, 21, 01. <https://doi.org/10.1641/B580303>
- Dickinson, J.L., Shirk, J., Bonter, D., Bonney, R., Crain, R.L., Martin, J., ... & Purcell, K. (2012). The current state of citizen science as a tool for ecological research and public engagement. *Frontiers in Ecology and the Environment*, 10(6), 291-297. In G. Papadopoulos (Ed.), *Proceedings of the 9th International Conference KICSS*. Limassol, Cyprus, 6-8 Nov 2014, 446-451. <https://doi.org/10.1007/978-3-319-27478-2>
- Ferran-Ferrer, N. (2015). Volunteer participation in citizen science projects. *El Profesional de la Información*, 24, 6, 827-837. <https://doi.org/10.3145/epi.2015.nov.15>
- Follett, R., & Strezov, V. (2015). An analysis of citizen science based research: Usage and publication patterns. *PloS One*, 10(11), e0143687. <https://doi.org/10.1371/journal.pone.0143687>
- Gura, T. (2013). Citizen science: Amateur experts. *Nature*, 496(7444), 259-261. <https://doi.org/10.1038/nj7444-259a>
- Hand, E. (2010). People power. *Nature*, 466(7307), 685-687. <https://doi.org/10.1038/466685a>
- Hines, P., Holweg, M., & Rich, N. (2004). Learning to evolve: A review of contemporary lean thinking. *International Journal of Operations & Production Management*, 24(10), 994-1011. <https://doi.org/10.1108/01443570410558049>
- Irwin, A. (1995). *Citizen science: A study of people, expertise and sustainable development*. London: Taylor & Francis. <https://doi.org/10.4324/9780203202395>
- Jasanoff, S. (2003). Technologies of humility: Citizen participation in governing science. *Minerva*, 41(3), 223-244. <https://doi.org/10.1023/A:1025557512320>
- Jasanoff, S. (Ed.). (2004). *States of knowledge: The co-production of science and the social order*. London: Routledge. (<https://goo.gl/xBNB3C>)
- Kellogg, W.K. (2004). *Using logic models to bring together planning, evaluation, and action: Logic model development guide*. Battle Creek, Michigan: WK Kellogg Foundation. (<https://goo.gl/pCPB52>)
- Kensing, F., & Blomberg, J. (1998). Participatory design: Issues and concerns. *Computer Supported Cooperative Work (CSCW)*, 7(3-4), 167-185. <https://doi.org/10.1023/A:1008689307411>
- Krippendorff, K. (1990). *Metodología de análisis de contenido: teoría y práctica*. Barcelona: Planeta.
- Manzini, E., & Coad, R. (2015). *Design, when everybody designs: An introduction to design for social innovation*. Cambridge, MA: The MIT Press (<https://goo.gl/FRjV3B>)
- Mindell, J.S., Jones, P., Vaughan, L., Haklay, M., Scholes, S., Ancaes, P., & Dhanani, A. (2017). *Street Mobility Project: Toolkit*. (<https://goo.gl/yxDuXk>)
- Nagle, T., & Sammon, D. (2016). The development of a Design Research Canvas for data practitioners. *Journal of Decision Systems*, 25(sup1), 369-380. <https://doi.org/10.1080/12460125.2016.1187386>
- Newman, G., Wiggins, A., Crall, A., Graham, E., Newman, S., & Crowston, K. (2012). The future of citizen science: Emerging technologies and shifting paradigms. *Frontiers in Ecology and the Environment*, 10(6), 298-304. <https://doi.org/10.1890/110294>
- Onwuegbuzie, A.J., & Leech, N.L. (2006). Linking research questions to mixed methods data analysis procedures I. *The Qualitative Report*, 11(3), 474-498. (<https://goo.gl/dJZ7An>)
- Perelló, J., Ferran-Ferrer, N., Farré, S., & Bonhoure, I. (2017). Secondary school rubrics for citizen science projects. In C. Heredotouand, E. Scanlon, & M. Sharples, (Eds.), *Citizen inquiry: Synthesising science and inquiry learning*. London: Taylor and Francis. [In press].
- Sagarra Pascual, O. J., Gutiérrez-Roig, M., Bonhoure, I., & Perelló, J. (2016). Citizen Science Practices for Computational Social Science Research: The Conceptualization of Pop-Up Experiments. *Frontiers in Physics*, 3(93), 1-14. <https://doi.org/10.3389/fphy.2015.00093>
- Sanders, E. (2006). Design serving people. *Cumulus Working Papers*, 28-33. (<https://goo.gl/JXqodm>)
- Sanders, E., & Stappers, P.J. (2008). Co-creation and the new landscapes of design. *Co-design*, 4(1), 5-18. <http://doi.org/10.1080/15710880701875068>
- Shirk, J., Ballard, H., Wilderman, C., Phillips, T., Wiggins, A., Jordan, R., ... & Bonney, R. (2012). Public participation in scientific research: A framework for deliberate design. *Ecology and Society*, 17(2). <https://doi.org/10.5751/ES-04705-170229>
- Tweddle, J.C., Robinson, L.D., Pocock, M.J.O., & Roy, H.E. (2012). *Guide to citizen science: developing, implementing and evaluating citizen science to study biodiversity and the environment in the UK*. London: Natural History Museum and NERC Centre for Ecology & Hydrology for UK-EOF. (<https://goo.gl/9QSBHr>)
- Wiggins, A., & Crowston, K. (2015). Surveying the citizen science landscape. *First Monday*, 20(1). <https://doi.org/10.5210/fm.v20i1.5520>
- Wylie, S.A., Jalbert, K., Dosemagen, S., & Ratto, M. (2014). Institutions for civic technoscience: How critical making is transforming environmental research. *The Information Society*, 30(2), 116-126. <https://doi.org/10.1080/01972243.2014.875783>
- Yañez-Figueroa, J.A., Ramírez-Montoya, M.S., & García-Peñalvo, F.J. (2016). Systematic mapping of the literature: Social innovation laboratories for the collaborative construction of knowledge from the perspective of open innovation. In *Proceedings of the Fourth International Conference on Technological Ecosystems for Enhancing Multiculturality* (pp. 795-803). ACM. <https://doi.org/10.1145/3012430.3012609>



# Wikipedia in higher education: Changes in perceived value through content contribution

## Wikipedia en la Universidad: cambios en la percepción de valor con la creación de contenidos

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### ABSTRACT

Wikipedia is a widely used resource by university students, but it is not necessarily regarded as being reliable and trustworthy by them, nor is it seen as a context in which to make content contributions. This paper presents a teaching and research project that consisted in having students edit or create Wikipedia articles and testing whether or not this experience changed their perceived value of the platform. We conducted our experience at Universitat Pompeu Fabra (Barcelona, Spain) and University of Niš (Niš, Serbia) with a total number of 240 students. These students edited articles and answered two questionnaires, one before and one after the exercise. We compared the pre and post experience answers to the questionnaires with a series of paired samples *t*-tests, through which our data showed that students did significantly change their perception of reliability and usefulness, and of likelihood of finding false information on Wikipedia. Their appreciation of the task of writing Wikipedia articles, in terms of it being interesting and challenge also increased. They did not significantly change, however, their judgement on the social value of the platform, neither in the university nor in the general context. In addition, the open questions and informal feedback allowed us to gather valuable insights towards the evaluation of the overall experience.

### RESUMEN

Wikipedia es un recurso muy utilizado por estudiantes universitarios, pero no está necesariamente bien valorado en términos de fiabilidad, ni tampoco es visto como un entorno en el que hacer aportaciones de contenido. Este artículo presenta un proyecto de docencia e investigación que consiste en proponer que los estudiantes editen o creen artículos para la Wikipedia, y en comprobar si la experiencia modifica su valoración de la misma. Se realizó la experiencia en la Universidad Pompeu Fabra (España) y la Universidad de Niš (Serbia) con un total de 240 alumnos. Editaron artículos y respondieron dos cuestionarios, uno antes y otro después de la experiencia. Se compararon las respuestas mediante una serie de pruebas *T* para muestras emparejadas, a partir de las cuales pudimos comprobar que los datos mostraban un cambio significativo en su percepción sobre la fiabilidad y la utilidad de la Wikipedia y sobre la probabilidad de encontrar información falsa en ella. También cambió su apreciación de la tarea de editar artículos, que se valoró como interesante y representó un reto. En cambio, su valoración del prestigio social de la Wikipedia, tanto en el contexto universitario como el general, no varió significativamente. Adicionalmente, las preguntas abiertas y el feedback informal permitieron recoger informaciones muy valiosas respecto a la valoración del conjunto de la experiencia.

### KEYWORDS | PALABRAS CLAVE

Collaborative learning, Internet, information, competence, university, students, literacy, digital culture.  
Aprendizaje colaborativo, Internet, información, competencia, universidad, estudiantes, alfabetización, cultura digital.



## 1. Introduction

The use of Wikipedia in education has been implemented in a significant number of cases and has become a common practice in recent years, as it can be seen for instance on the Wikimedia Outreach Education Program website (Wikimedia, 2016). Recently, Lerga and Aibar have published an extensive and detailed guide on how to use Wikipedia in higher education, which includes categories of possible activities such as critical analysis of existing articles, expanding and improving existing articles and creating new articles, among others (Lerga & Aibar, 2015).

These practices have been shown as having significantly improved some basic skills in students, such as interaction and communication, writing and comprehension, research and motivation, along with the social benefits of contributing to and participating in the open resource culture of the project (Lerga & Aibar, 2015; Ricaurte-Quijano & Álvarez, 2016) as part of the open knowledge (García-Peñalvo, García-de-Figuerola, & Merlo-Vega, 2010; Ramírez-Montoya & García-Peñalvo, 2015). Along with this, it is important to note that they also foster the development of media literacy skills and the collaboration among students (Dawe & Robinson, 2017; Di-Lauro & Johnke, 2017), and of students with Wikipedians. It has been noted that the participation in an established online community –with its tacit rules and cultural norms– represents a process of acculturation that can be very valuable to the students (Brailas & al., 2015).

However, there are still many concerns among the faculty in the universities regarding the use of Wikipedia, mostly due to a perceived lack of credibility, accuracy and reliability by a significant number of teachers (Llados & al., 2013; Aibar & al., 2014; Konieczny, 2014), although these have grown smaller over time (Shachaf, 2009; Soules, 2015). In recent years, there have been significant efforts to report on and advocate for the formal use of Wikipedia in academic practices (Konieczny, 2016; Freire & Li, 2016; Meseguer-Artola & al., 2016; Jemielniak & Aibar, 2016; Di-Lauro & Johnke, 2017), and even to push Wikipedia's importance in assessing academic research impact (Kousha & Thelwall, 2016).

On the part of the students, it is certainly a widely used resource, but it is not necessarily valued regarding credibility or usefulness either (Meseguer-Artola, 2014; Selwyn & Gorard, 2016; Huang & al., 2016). Arguably, this is often due to a lack of knowledge of how the processes of editing and discussing articles take place (Menchen-Trevino & Hargittai, 2011).

Among the motivations to introduce Wikipedia in the classroom, previous research has identified mainly two types of reasons. First, strictly from the pedagogical point of view, it is seen as a very valid exercise to enhance students' literacy skills (Hafner, Chik, & Jones, 2015; Walker & Li, 2016; Di-Lauro & Johnke, 2017). Certainly, the process of writing for Wikipedia covers all the aspects of academic writing –originality, rigor, peer review, etc.– with the benefits of immediate dissemination, an aspect which connects to the second type of reasons identified. Jemielniak & Aibar (2016) have noted the immense readership of the platform, and the fact that contributing to it helps to popularize the respective fields of research within which the activities are inscribed, while it represents contributing to the benefit of the wider society. Wikipedia is not only part of but the paradigm of the open culture of Internet. And it is in the contribution to this that many authors inscribe their interest in these types of activities (Shane-Simpson, Che, & Brooks, 2016; Luyt, 2016), hoping to engage the students in the same type of motivation that Wikipedians have (Nov 2007). In our case, along with these two reasons, it was important for us to invite our students to contribute to a platform that they all use extensively, but not necessarily value as a relevant cultural artefact.

Additionally, we deemed important to enquire about the editing of text in a multilingual context. In both cases, our students were able to read articles in at least in three languages (Catalan, Spanish, and English for Universitat Pompeu Frabra students; Serbian, Croatian, Bosnian and English for University of Niš students). Contrasting and comparing the different versions became part of the exercise, as it is an interesting aspect to be able to acknowledge the difference in coverage and the possible biases in the different language editions, which have been identified in the literature as being more likely to occur in smaller language communities, as it is expected that they would have a smaller community involved in the culture adaptation process (Massa & Scrinzi, 2012; Eom & al., 2015).

The work presented here draws upon the authors' previous research on different areas related to the pedagogic uses of information technologies and open platforms. Some of these efforts have addressed the process of acquisition and evaluation of generic and transversal skills, such as socialization process, critical capacity (Freixa & Sora, 2008) or of academic writing standards (Freixa & al., 2013), along with more generic accounts of the competencies for the practice of interactive communication (Soler-Adillon & al., 2016), and some specific studies on the use of interactive and communications technologies in education (Pavlovic, Stanisavljevic-Petrovic, & Soler-Adillon, 2016; Stanisavljevic-Petrovic, Pavlovic, & Soler-Adillon, 2016).



The study presented in this paper was designed during the 2015-2016 academic year in collaboration with Amical Wikimedia and implemented during the Summer term on both Universitat Pompeu Fabra (Spain) and University of Niš (Serbia). Section two explains the design of the study and the context in which it took place, including the creation of the questionnaires that served as the basis for it. Section 3 presents the results of the questionnaires, which students responded before and after taking part in the creation and editing of Wikipedia articles, that were aimed at exploring the changes in perception of it after the task, both through Likert scales and open questions. Finally, section 4 discusses these results with respect to the initial hypothesis and the existing literature presented in this introduction.

## 2. Material and methods

Our investigation took place in two different higher education institutions: Universitat Pompeu Fabra (UPF) in Barcelona, Spain, and University of Niš (UN) in Niš, Serbia, during April to June of 2016. Students were asked to fill in two questionnaires: one

before editing a Wikipedia article as a course exercise, and one after the experience. The project was partially funded by UPF's Center for Learning Innovation and Knowledge and also had the support of Amical Wikimedia, the independent association of volunteers for the promotion of Catalan culture through the Catalan version of Wikipedia.

At UPF, the experience took place in the Digital Culture class, a first-year mandatory course in the Audiovisual Communication undergraduate degree. The topics of the course range from digital photography and ani-

mation to interactive art and interaction design. At UN, the experience took place in the Computer Science class, a first-year mandatory course on Communication and Public Relations, as well as on Journalism undergraduate degrees. The topics of the course cover the history of computers, hardware, software, multimedia and the Internet.

The two questionnaires (Q1 and Q2 for pre and post experience respectively) were designed to address our research question about the perception of Wikipedia before and after the experience of editing or creating an article, in the form of both Likert scale and open questions. In addition, we added a series of general questions regarding the use of Wikipedia and, since we were performing our study in two contexts in which we could expect students to be able to access at least three different language editions of this online encyclopaedia, we also added some questions about language use and choice for editing. However, the focus of the study was, as said, on the perception of Wikipedia, and thus we will be discussing here this part of the research.

The main research question we were addressing with this design was: "Will the participation of the students in the process of editing and creating Wikipedia articles influence their perception of the platform from reliability, trustworthiness and value within the academic and general context?".

### 2.1. Design of the activity

This study on the perception of Wikipedia is part of a larger pedagogical effort, within which the researchers implemented the creation of content for this open platform. The aim of the activity was for our students to become familiar with the process of writing for Wikipedia and, through this, to understand the process of collaborative writing, peer review, good academic practices and to contribute to an open access platform. By writing Wikipedia

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articles instead of strict academic essays, we were hoping that they would engage in a new, challenging experience, while contributing to their work to a project that they use extensively.

A secondary goal was to enhance the coverage of Wikipedia on the areas of our courses. Thus, while giving the students a large degree of freedom to find topics they were interested in, their work would immediately become valuable for future students on their degrees. This academic experience was designed with the invaluable guidance of volunteers at Amical Wikimedia, who has extensive experience in designing workshops and activities were participants edit and create articles.

It was important that the experience for the students was properly guided, and that they responded the questionnaires at relevant times. Thus, Q1 was given to the students before their first contact with the edition process of the Wikipedia, and Q2 once they had already finished their article. In between, they were given a general introduction to the process of editing and creating articles, and were guided throughout the process with the help of the Wikipedia volunteers both directly and through platform's peer review process.

Following this procedure, we were able to make sure that the questions in Q2 were answered only after the whole process of editing had been completed, including research, editing, and dealing with the platform conventions and curating process – through both robots and volunteers.

## 2.2. Questionnaires

Q1 had four main sections. It was designed to gather a general idea of the student's uses and knowledge of Wikipedia, and it contained a set of questions that would be repeated in Q2 to test the changes before and after the experience of editing Wikipedia articles. As said above, this was the central part of the study and consequently that on which this paper is focused.

The first and largest section in Q1 enquired about the general use of Wikipedia, asking about situations and patterns of use. It used Likert scales, either temporarily based (always / usually / occasionally / rarely / never) or a more common one based on agreement to a statement (strongly agree / agree / cannot decide / disagree / strongly disagree). It contained 16 Likert-based questions and one open question.

Section 2 and 3 enquired about Wikipedia editing (expected interest and challenge) and value of Wikipedia respectively. These sections contained the following questions, which were those repeated in Q2:

- Editing Wikipedia articles is an interesting task.
- Editing Wikipedia articles is a challenging task.
- Wikipedia is a reliable source [for use] in the University context.
- Wikipedia is a useful source of information.
- It is possible to find false information on Wikipedia.
- Do you think that the consideration of Wikipedia is correct in the context of University studies?
- Do you think that the consideration of Wikipedia is correct in general?

Whilst the first five were answered with an Agree / Disagree Likert scale, we created an ad-hoc Likert scale for the last two questions, so that students could choose between the following: It is strongly undervalued / It is a little undervalued / Its consideration is correct / It is a little overrated / It is strongly overrated.

Q2 was shorter, and it repeated the questions mentioned above with an open question at the end of the section. Before ending with a final section on language, it briefly enquired the students about the process of writing the articles and whether or not they thought that they would keep editing it.

## 3. Results

The overall participation was of 240 students. Each of them was required to either edit significantly or create from scratch an article for the Wikipedia related to their field of study as part of their course assignments. They were also required to answer two questionnaires, one before and one after the experience.

67.5% of the participants were UN students (N=162), and 32.5% were UPF students (N=78). 67.9% were female participants (N=163), 30.8% males (N=74), and 1.2% (N=3) preferred not to answer. A 75.4% of the students were first years (N=181), 10.8% were third-year students (N=26), and 13.7% were in their fourth year (N=33).

### 3.1. Quantitative data: statistical and descriptive analysis

A series of paired-samples t-test was conducted to compare the answers in Q1 and Q2 on these questions that were identical in both questionnaires. What follows is a list of these questions and the results of each test, along

with some descriptive analysis of the percentages of the answers (see table 1 for details). The means are calculated from 0 being 'Strongly Disagree' to 4 being 'Strongly agree' on the first, and from 0 being 'It is strongly overrated' to 4 'It is strongly undervalued' on the latter two (see previous sections for details on the scale answers). The significance threshold was set at .05 for all cases.

a) Editing Wikipedia articles is an interesting task. There was a significant difference in the scores for Q1 ( $M=2.4$ ,  $SD=0.71$ ) and Q2 ( $M=2.8$ ,  $SD=0.69$ ) conditions;  $t(4)=-5.176$ ,  $p < .001$ . Not surprisingly, in Q1 there were a significant number of students who remained neutral in their answer (45.4%). Many others (43.3%) selected 'Agree' on this statement, leaving the rest of the options in very low numbers. In Q2, a very important number of answers agreed with the statement (70.3%), which added to an almost 5% increase on the 'Strongly agree' showed a combined agreement 78.9%, leaving an even smaller percentage on the negative spectrum (5.6% 'Disagree' and 0.6% 'Strongly disagree'), while still a 14.9% of the answers remained on the neutrality of 'Can not decide'.

b) Editing Wikipedia articles is a challenging task. There was a significant difference in the scores for Q1 ( $M=2.7$ ,  $SD=0.78$ ) and Q2 ( $M=3.1$ ,  $SD=0.74$ ) conditions;  $t(4)=-4.53$ ,  $p < .001$ . This question presented almost identical shifts on the answers' percentages regarding the previous one, although with much lower numbers. The two positive answers went up from a combined 66.6% to an 84.6% (with about a quarter of the students agreeing strongly), while the negative remained in the 4.6%, but going to a null percentage in the 'Strongly disagree'.

c) Wikipedia is a reliable source [for use] in the University context. There was a significant difference in the scores for Q1 ( $M=1.9$ ,  $SD=0.99$ ) and Q2 ( $M=2.6$ ,  $SD=0.91$ ) conditions;  $t(4)=-6.591$ ,  $p < .001$ . This question

		Q1	Q2	change
Editing Wikipedia articles is an interesting task	Strongly agree	3.8	8.6	4.8
	Agree	43.3	70.3	27
	Cannot decide	45.4	14.9	-30.5
	Disagree	6.3	5.6	-0.7
Editing Wikipedia articles is a challenging task	Strongly disagree	1.2	0.6	-0.6
	Strongly agree	15.4	26.3	10.9
	Agree	51.2	58.3	7.1
	Cannot decide	28.7	10.9	-17.8
Wikipedia is a reliable source [for use] in the University context	Disagree	4.2	4.6	0.4
	Strongly disagree	0.4	0	-0.4
	Strongly agree	4.2	8.6	4.4
	Agree	29.2	56	26.8
Wikipedia is a useful source of information	Cannot decide	28.8	20	-8.8
	Disagree	32.5	13.1	-19.4
	Strongly disagree	5.4	2.3	-3.1
	Strongly agree	20	24	4
It is possible to find false information on Wikipedia	Agree	65	68.6	3.6
	Cannot decide	11.3	5.7	-5.6
	Disagree	3.3	1.7	-1.6
	Strongly disagree	0.4	0	-0.4
Do you think that the consideration of Wikipedia is correct in the context of University studies?	Strongly agree	21.7	14.3	-7.4
	Agree	58.8	53.1	-5.7
	Cannot decide	13.7	18.3	4.6
	Disagree	5	9.7	4.7
Do you think that the consideration of Wikipedia is correct in general?	Strongly disagree	0.8	4.6	3.8
	It is strongly undervalued	5	8	3
	It is a little undervalued	41.7	42.5	0.8
	It's consideration is correct	37.9	34.9	-3
Do you think that the consideration of Wikipedia is correct in general?	It is a little overrated	14.2	14.3	0.1
	It is strongly overrated	1.2	0	-1.2
	It is strongly undervalued	3.8	7.4	3.6
	It is a little undervalued	38.8	42.3	3.5
Do you think that the consideration of Wikipedia is correct in general?	It's consideration is correct	44.2	41.7	-2.5
	It is a little overrated	12.5	8	-4.5
	It is strongly overrated	0.8	0.6	-0.2

presents the most remarkable changes from Q1 to Q2. While the 'Cannot decide' remains still a big number on Q2 (20%, down from 28.8%), there is a 31.2% increase in the positive spectrum, with the 'Agree,' growing from 29.2% to 56%, and a 22.5% decrease on the negative spectrum. Thus, while in the first two questions there is a clear trend from undecided to positive, here there is a much bigger shift from negative to positive answers.

d) Wikipedia is a useful source of information. There was a significant difference in the scores for Q1 ( $M=3.0$ ,  $SD=0.70$ ) and Q2 ( $M=3.1$ ,  $SD=0.59$ ) conditions;  $t(4)=-2.622$ ,  $p=.010$ . The changes in this question are more mitigated than on the previous ones. All the positive answers' percentages increase, but only a combined 7.6% from already big numbers (85% in Q1). The negative answers went from 3.7% to 1.7%, with 0% 'Strongly disagree'. Thus, the perception of usefulness, which was already strong, strengthened according to Q2.

e) It is possible to find false information on Wikipedia. There was a significant difference in the scores for Q1 ( $M=3.0$ ,  $SD=0.77$ ) and Q2 ( $M=2.6$ ,  $SD=0.99$ ) conditions;  $t(4)=3.953$ ,  $p<.001$ . Contrary to the others, in this case, the alternative hypothesis was that the change would be towards disagreement with the statement. And while the change was shown to be statistically relevant, the percentages shifted in relatively small numbers. The agreement with the statement was initially very high, with 21.7% 'Strongly agree' and 58.8% 'Agree'. In Q2 these numbers dropped in a 7.4% and 5.7% respectively. Interestingly, this is the only question where the 'Cannot decide' increased after editing Wikipedia articles (from 13.7% in Q1 to 18.3% in Q2). The combined disagreement went up from 5.8% to 14.3%.

f) Do you think that the consideration of Wikipedia is correct in the context of University studies? There was not a significant difference in the scores for Q1 ( $M=2.3$ ,  $SD=0.84$ ) and Q2 ( $M=2.4$ ,  $SD=0.83$ ) conditions;  $t(4)=-1.061$ ,  $p=.290$ . As it can be expected by the non-rejection of the null hypothesis of the paired samples t-test, the numbers in this question changed relatively little, although they did so in the anticipated direction. Most of the students' answers indicated that they considered that Wikipedia was correctly regarded within the University context regarding reliability (37.9%), while even more considered that it was slightly undervalued (41.7%), with 5% saying that it was strongly undervalued. These numbers changed to 8% on the latter and increased only by 0.8% on the former, while the middle option lost a 3%. The answer stating that is a little overrated virtually remained the same, while strongly overrated option lost all of its already small 1.2% support.

g) Do you think that the consideration of Wikipedia is correct in general? There was not a significant difference in the scores for Q1 ( $M=2.3$ ,  $SD=0.79$ ) and Q2 ( $M=2.5$ ,  $SD=0.77$ ) conditions;  $t(4)=-1.896$ ,  $p=.060$ . Like with the former question, the changes here weren't big enough to be accounted for as statistically relevant, although as one might anticipate by the p value, they were somewhat bigger. Again, the students considering that it was undervalued –this time in the general context– augmented, from a combined 42.6% to a 49.7%, while 44.2% in Q1 and 41.7% in Q2 answered that Wikipedia's reputation was correct. The students stating that it was overrated went down from a combined 13.3% to 8.6%.

Summarizing, only on the first five questions show a statistically significant change from Q1 to Q2, while the answers to the two questions on the consideration of Wikipedia were not different enough to reject the null hypothesis, and thus we cannot conclude that the students' opinion in respect to this changed with the article editing exercise. On the contrary, our research hypothesis was confirmed for the rest of the questions: there was a significant increase in students' perception of usefulness, reliability, and confidence in not finding false information in Wikipedia. Likewise, students found both more interesting and more challenging to edit Wikipedia articles in Q2 than in Q1.

### 3.2. Open questions and student feedback

The second focus of interest was on the feedback we received from students both informally and in the form of open questions and course feedback. The main open question in Q2 addressed specifically and quite directly the focus of the study, by asking the participants "How did editing a WP article change your perception of it?".

The answers to this question were overwhelmingly positive in the sense that they praised the robustness of the project regarding the quality of the information it hosts, and thus stating that after the experience they thought of it as a much more reliable platform. Examples of these answers are:

- "Now I think that we can't find false information on Wikipedia".
- "Now I know that it is not possible to make anything up. Every word is checked, and so is each article several times".
- "I started to value the information found on Wikipedia more than I used to before I edited it".
- "The need to reference everything made me realize it's more reliable than I thought it was".
- "I've seen it's more reliable than they say".

- “It changed my perception because of the volunteers that look after every article, which makes Wikipedia more reliable”.

- “Now I am sure that the information found in Wikipedia is reliable because there are a lot of volunteers that correct what you write, being very strict in referencing information”.

- “I realised how rigorous the supervision is”.

- “It has changed a lot. I think I was underestimating Wikipedia”.

A much smaller number of comments went in the exact opposite direction, either with quite broad strokes on how everyone can intervene, or addressing the authors’ biases:

- “I realized that anyone could edit a Wikipedia article and I learned how easy it is to add new information that can be referenced but not necessarily true”.

- “I realized that everybody could write whatever they want”.

- “Seeing how easy it is that anyone can edit it make me loose a bit of the trust I had in the page”.

- “Now I’m aware that behind an article there is the person who wrote it, with his/her own opinion, which influences the information”.

Finally, many students used their answer to this question to address the process of writing, and how it changed not their perception of how reliable or solid the project is, but how difficult (or in a few cases easy) it is to write an article and publish it there, without making judgements on trustworthiness in general:

- “I thought that it was an easy job, but I guess I was wrong about it”.

- “After my text was corrected, I realized changing Wikipedia articles wasn’t easy. Only people who are well informed about certain topics can change the articles”.

- “I now think that editing a Wikipedia articles is more difficult than I have thought before. It is like writing small scientific article for University. You have to take care of references and lots of other small things and check lots of facts and respect lots of rules of writing that are similar to writing scientific work for the University. To sum up, it is a very challenging task that needs your full concentration and attention”.

- “It is harder than I thought”.

- “It is a heavy work so big applause for the people who work on it”.

- “It made me realize how easy is to contribute”.

- “It is easy to edit and very useful for other people”.

Informally, both by following the students’ progress and by talking to them, we could gather some interesting insights on how they were changing their perceptions. At the University of Niš, some students entered false information to see what happened and were very (and positively) surprised to find out that the information was changed in a matter of hours. In general, students were surprised by the efficiency of the volunteers monitoring the process. Mostly, this experience with the peer review process was positive, although in some cases the students were frustrated because they had to remove content and they considered that some particular volunteers were overzealous.

Another aspect that they enjoyed was the fact that their work would be made public immediately, and they had a strong sense of contributing to their field of interest, thus becoming very much aware of the collaborative effort behind Wikipedia and the importance of the open culture behind it. For some of them, it was particularly interesting to interact with the person they were writing about. When it was relevant, we encouraged students to get in touch

**The overall experience was a very positive one.**

**Integrating Wikipedia in the classroom was successful from both the point of view of the students’ perception of the online encyclopaedia and as a pedagogic exercise. There are some challenges that should be taken into account before using this type of exercise as a formal assessment: mainly, the unpredictability of the peer review process through the intervention of the volunteers, which can vary greatly from article to article.**

with them, or with someone who had studied them. Beyond the general help in finding references and the positive answers that the students received, there were some especially interesting situations, such as a person attending the presentation of the Wikipedia article on himself, and a group of students getting in touch with the daughter of Edgar Rubin, who sent them an unpublished photo of him – which is still in the process of becoming public access and thus publishable to Wikipedia.

In any case, as seen by the answers to the open questions and from what we gathered through informal feedback, there was a general consensus that Wikipedia was, in fact, a very strict environment where it was not easy to publish, and that this process ensured a high degree of reliability of the information published in it and, consequently, improved the perceived value of the platform.

#### 4. Discussion and conclusions

Based on the survey results, it is possible to state that editing and creating Wikipedia articles had in general terms a significant influence on the perception of Wikipedia by the students, in terms of reliability, trustworthiness, and robustness of the process of posting information on the platform, and also proved that they found that the process was both interesting and challenging. However, we cannot conclude from our data that their perception of the appreciation of Wikipedia changed, both in general and in the context of University.

Students had already anticipated that editing Wikipedia articles would be both interesting and challenging, and these perceptions were stronger after the experience, with significantly bigger numbers moving from the undecided to the positive answers. In addition, as shown above, many of the comments to the open question referred to this aspect, stating that it had been difficult to get their information published on the site.

This appreciation of the robustness of the project of peer review within Wikipedia was linked, as the open question shows, to their perception of the reliability of the project. This is confirmed by the answers to the third question and to that referred to the possibility of finding false information on Wikipedia. They also gained some confidence in the usefulness of the project, although their appreciation of it from that point of view was already very strong from the start. Thus, the hypothesis underlying our research question, which stated that students would regard Wikipedia as a more reliable project after participating in the creation of content, was confirmed.

The overall experience was a very positive one. Integrating Wikipedia in the classroom was successful from both the point of view of the students' perception of the online encyclopaedia and as a pedagogic exercise. There are some challenges that should be taken into account before using this type of exercise as a formal assessment: mainly, the unpredictability of the peer review process through the intervention of the volunteers, which can vary greatly from article to article. However, as noted by Di-Lauro & Johnke (2017), while certainly lacking the rigour of the academic publication peer review, it is a very thorough and well-documented process, and the involvement in the community is beneficial for the students. In any case, in general terms, and as the survey and informal feedback accounted for, the advantages of it superseded the difficulties. Additionally, we were successful in improving the coverage of Wikipedia to our teaching domain, thus involving our higher academic institutions in the process of content curation of a resource that has become more and more important in our context. Along the lines of the suggestions of Jemiłniak and Aibar (2016), this is, in turn, a contribution to disseminating the work that is being done at the higher education institutions, thus transferring this knowledge to the wider society. Finally, strictly regarding the study of the perception of Wikipedia, we aim at improving our method by adding several more questions to address specific issues on trust, the perception of reliability and use, and to do so in a much larger number of students internationally.

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#### References


- Aibar, E., Lladós-Masllorens, J., Meseguer-Artola, A., Minguillón, J., & Lerga, M. (2015). Wikipedia at university: What faculty think and do about it. *The Electronic Library*, 33(4), 668-683. <https://doi.org/10.1108/EL-12-2013-0217>
- Brailas, A., Koskinas, K., Dafermos, M., & Alexias, G. (2015). Wikipedia in Education: Acculturation and learning in virtual communities.

- Learning, Culture and Social Interaction*, 7, 59-70. <https://doi.org/10.1016/j.lcsi.2015.07.002>
- Dawe, L., & Robinson, A. (2017). Wikipedia editing and information literacy: A case study. *Information and Learning Science*, 118(1/2), 5-16. <https://doi.org/10.1108/ILS-09-2016-0067>
- Di-Lauro, F., & Johnke, R. (2017). Employing Wikipedia for good not evil: innovative approaches to collaborative writing assessment. *Assessment & Evaluation in Higher Education*, 42(3), 478-491. <https://doi.org/10.1080/02602938.2015.1127322>
- Eom, Y.H., Aragón, P., Laniado, D., Andreas, K., Vigna, S., & Shepelyansky, D.L. (2015). Interactions of Cultures and Top People of Wikipedia from Ranking of 24 Language Editions. *PLoS ONE*, 10(3). <https://doi.org/10.1371/journal.pone.0114825>
- Freire, T., & Li, J. (2016). Using Wikipedia to enhance student learning: A case study in economics. *Education and Information Technologies*, 21(5), 1169-1181. <http://doi.org/10.1007/s10639-014-9374-0>
- Freixa, P., & Sora, C. (2008). *Proyecto Universo de la Comunicación Audiovisual: una representación visual, transversal y participativa en la Red. I Jornadas de Innovación Docente aplicada a las Tecnologías de la Información y las Comunicaciones (ID+TIC 2008)*. Universidad de Alcalá de Henares (2008-07-17/18). (<https://goo.gl/7Qq9Vt>).
- Freixa-i-Font, P., Sora, C., Soler-Adillon, J., & Ribas, J.I. (2013). Concepción, diseño y evaluación del tutorial interactivo: Cómo elaborar un trabajo académico. Un estudio de caso. *Hipertext.net*, 11. (<https://goo.gl/MMxDoi>).
- García-Peñalvo, F.J., García-de-Figuerola, C., & Merlo, J.A. (2010). Open knowledge: Challenges and facts. *Online Information Review*, 34(4), 520-539. <https://doi.org/10.1108/14684521011072963>
- Hafner, C.A., Chik, A., & Jones, R.H. (2015). Digital literacies and language learning. *Language Learning and Technology*, 19(3), 1-7. (<https://goo.gl/C6rCcG>).
- Huang, J., Shi, S., Chen, Y., & Chow, W.S. (2016). How do students trust Wikipedia? An examination across genders. *Information Technology & People*, 29(4), 750-773. <https://doi.org/10.1108/ITP-12-2014-0267>
- Jemielniak, D., & Aibar, E. (2016). Bridging the gap between Wikipedia and Academia. *Journal of the Association for Information Science and Technology*, 67(7), 1773-1776. <https://doi.org/10.1002/asi.23691>
- Kayvan, K., & Thelwall, M. (2017). Are Wikipedia citations important evidence of the impact of scholarly articles and books? *Journal of the Association for Information Science and Technology*, 68(3), 762-779. <https://doi.org/10.1002/asi.23694>
- Konieczny, P. (2016). Teaching with Wikipedia in a 21st-century classroom: Perceptions of Wikipedia and Its educational benefits. *Journal of the Association for Information Science and Technology*, 67(7), 1523-1534. <https://doi.org/10.1002/asi.23616>
- Konieczny, P. (2014). Rethinking Wikipedia for the classroom. *American Sociological Association*, 13, 80-84. <https://doi.org/10.1177/1536504214522017>
- Lerga, M., & Aibar, E. (2015). *Best Practice Guide to Use Wikipedia in University Education*. (<http://hdl.handle.net/10609/41662>).
- Lladós, J., Aibar, E., Lerga, M., Meseguer, A., & Minguillón, J. (2013). An empirical study on faculty perceptions and teaching practices of wikipedia. *Proceedings of the European Conference on E-Learning, ECEL*, 258-265. (<https://goo.gl/Rdweyy>).
- Luyt, B. (2016). Wikipedia, Collective Memory, and the Vietnam War. *Journal of the Association for Information Science and Technology*, 67(8), 1956-1961. <https://doi.org/10.1002/asi.23518>
- Massa, P., & Scrinzi, F. (2013). Manyedia: Comparing language points of view of Wikipedia communities. *First Monday*, 18(1). <https://doi.org/10.5210/fm.v18i1.3939>
- McKerlich, R., Ives, C., & McGreal, R. (2013). Measuring use and creation of open educational resources in higher education. *International Review of Research in Open and Distance Learning*, 14(4), 90-103. <http://doi.org/10.19173/irrodl.v14i4.1573>
- Menchen-Trevino, E., & Hargittai, E. (2011). Young adults' credibility assessment of Wikipedia. *Information, Communication & Society*, 14(1), 24-51. <https://doi.org/10.1080/13691181003695173>
- Meseguer-Artola, A. (2014). Learning by comparing with Wikipedia: the value to students' learning. *Universities and Knowledge Society Journal*, 11(2), 57. <https://doi.org/10.7238/rusc.v11i2.2042>
- Meseguer-Artola, A., Aibar, E., Lladós, J., Minguillón, J., & Lerga, M. (2016). Factors That Influence the Teaching Use of Wikipedia in Higher Education. *Journal of the Association for Information Science and Technology*, 67(5), 1224-1232. <https://doi.org/10.1002/asi.23488>
- Nov, O. (2007). What motivates Wikipedians? *Communications of the ACM*, 50(11), 60-64. <https://doi.org/10.1145/1297797.1297798>
- Pavlovic, D., Stanisavljevic-Petrovic, Z., & Soler-Adillon, J. (2016). Traditional and (or) new media: Teacher's work experience and application of media in schools. In *Proceedings of the 12th International Scientific Conference eLearning and Software for Education*. Budapest. (<https://doi.org/10.12753/2066-026X-16-112>).
- Ramírez-Montoya, M.S., & García-Peñalvo, F.J. (2016). Movimiento educativo abierto. *VIRTUalis*, 6(12), 1-13. (<https://goo.gl/BVXGXF>)
- Ricaurte-Quijano, P., & Álvarez, A.C. (2016). The Wiki Learning Project: Wikipedia as an open learning environment. *Comunicar*, 49(24), 61-69. <https://doi.org/10.3916/C49-2016-06>
- Selwyn, N., & Gorard, S. (2016). Students' use of Wikipedia as an academic resource - Patterns of use and perceptions of usefulness. *The Internet and Higher Education*, 28, 28-34. <https://doi.org/10.1016/j.iheduc.2015.08.004>
- Shachaf, P. (2009). The paradox of expertise: Is the Wikipedia reference desk as good as your library? *Journal of Documentation*, 65(5), 977-996. <https://doi.org/10.1108/00220410910998951>
- Shane-Simpson, C., Che, E., & Brooks, P.J. (2016). Giving psychology away: Implementation of Wikipedia editing in an introductory human development course. *Psychology Learning & Teaching*, 15(3), 268-293. <https://doi.org/10.1177/1475725716653081>
- Soler-Adillon, J., Sora, C., Freixa, P., & Ribas, J.I. (2016). El perfil del profesional de la comunicación interactiva: fundamentos, actualidad y perspectivas. *El Profesional de La Información*, 25(2), 196-208. <https://doi.org/10.3145/epi.2016.mar.06>
- Soules, A. (2015). Faculty perception of Wikipedia in the California State University System. *New Library World*, 116(3/4), 213-226. <https://doi.org/10.1108/NLW-08-2014-0096>
- Stanisavljevic-Petrovic, Z., Pavlovic, D., & Soler-Adillon, J. (2016). ICT In early education: Reasons for insufficient application. *Proceedings*

of the 12th International Scientific Conference eLearning and Software for Education. Bucharest, 227-232. <https://doi.org/10.12753/2066-026X-16-119>

Walker, M.A., & Li, Y. (2016). Improving information literacy skills through learning to use and edit Wikipedia: A chemistry perspective. *Journal of Chemical Education*, 93(3), 509-515. <https://doi.org/10.1021/acs.jchemed.5b00525>

Wikimedia. (2016). *Wikimedia education portal*. (<https://goo.gl/xsDQXX>).



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# Ubiquitous learning ecologies for a critical cyber-citizenship

## Ecologías de aprendizaje ubicuo para la ciberciudadanía crítica

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### ABSTRACT

The aim of this research is to identify and analyse the ubiquitous learning acquired through blending education settings devoted to the “lifelong training of trainers” and how these contribute to the development of a conscious, critical and engaged citizenship. Through active exploration of the learning process, the study analyses the “soft skills” acquired which enhance performance in work and daily life, with the purpose of detecting the process of ubiquitous learning often overlooked in formal education. To this end, the study case presented here draws upon a data triangulation of qualitative and quantitative multisource information (questionnaires, interviews, participant observation, discussion groups, individual and collective diaries) which includes the study of the semantic networks consisting of learners’ own utterances. The results obtained indicate that the soft skills related to the capacity of self-development, the use of innovative resources, the enhancement of social cooperation, the ability to meet cognitive and social challenges, and the functional learning as produced through expanded learning, have the potential to pave the way for the empowerment of peoples, communities and social movements. But this form of expanded learning, as open, collaborative, democratic and committed learning, must be actively supported if future generations are not only to be consumers but also cooperative producers in a socially shared world.

### RESUMEN

El objetivo de este trabajo ha sido detectar y analizar los aprendizajes ubicuos adquiridos en entornos educativos expandidos destinados a la «formación permanente de formadores» y cómo estos influyen en la construcción de una ciudadanía consciente, crítica y comprometida. Se han analizado las «soft skills» adquiridas para el desenvolvimiento efectivo en el trabajo o la vida diaria, mediante la exploración activa del proceso formativo. Se ha tratado así de detectar el aprendizaje ubicuo que suele resultar invisible para la educación formal. Con este propósito, el estudio de caso aquí presentado recurre a una triangulación de análisis cualitativo y cuantitativo de información multifuente (cuestionarios, entrevistas, observación participante, grupos de discusión, diarios individuales y colectivos), que incluye análisis de red semántica de las expresiones de los participantes. Los resultados obtenidos nos indican que las «soft skills» relacionadas con la capacidad de desarrollo autónomo, el uso de medios y recursos transformadores, la potenciación de la cooperación social, la resolución de desafíos cognitivos y sociales, la potenciación del compromiso cívico y del aprendizaje funcional, que genera el aprendizaje expandido, se pueden convertir en un instrumento para el empoderamiento de personas, colectivos y movimientos sociales. Pero este aprendizaje expandido, como aprendizaje abierto y colaborativo, democrático y comprometido, requiere un apoyo consciente si se desea que las futuras generaciones no solo sean consumidoras, sino productoras colaborativas en un mundo socialmente compartido.

### KEYWORDS | PALABRAS CLAVE

Lifelong learning, ubiquitous learning, learning ecologies, expanded education, soft skills, semantic network, critical citizenship, social change.

Formación permanente, aprendizaje ubicuo, ecologías de aprendizaje, educación expandida, soft skills, red semántica, ciudadanía crítica, cambio social.



## 1. Introduction

The current cybersociety has widened the learning sphere generating “ubiquitous learning ecologies”, namely, environments that foster and support the creation of expanded learning networks and communities through the use of digital means in which knowledge is exchanged in both the virtual and face-to-face spaces. By this means the formal curriculum boundaries disappear to a significant extent (Cope & Kalantzis, 2010; Zemos-98, 2012; Gallego-Lema & al., 2016). Thus, new types of ubiquitous educational interaction are generated which are often overlooked in formal education (Buckingham, 2007). Not only these new types accommodate participants’ socio-economic and cultural diversity but also a high level of citizen engagement in accessing, producing, and exchanging knowledge (Cobo & Moravec, 2011; Nonaka & Takeuchi, 1995). Accordingly, this offers an opportunity for contributing to the development of a critical and participative cyber citizenship.

The effective deployment of the ubiquitous learning in the educational context, linked to daily life and work, tends to reinforce the acquisition of “soft skills” of instrumental, cognitive-intellectual, socio-communicative, emotional and digital character which might facilitate the establishment of a critical and extended citizenship (Rendueles, 2016). However, we question whether this civic building supported by communities of expanded learning are actually establishing a knowledge dialogue, democratic relations, and social participation (Putnam, 2009; Marí, 2010), fostering integration and cohesion processes as “Europe 2020 Strategy” (EC 2010) expects. On the contrary, it may end up stressing social exclusion, disintegration, the digital divide or decreasing trust in the possibility of achieving a reflexive and critical society (Bernabé, 2017).

The study developed by the authors aims at analysing to what extent this “ubiquitous” and “expanded learning” facilitated by Internet and social networks brings about not only other means to build collective and shared knowledge (anywhere, anytime) but also another way to build engaged citizenship and democratic participation. By this means, the study aims to ascertain whether the “soft skills” emerging from this ubiquitous learning lead to knowledge sharing, collaborative-proposals, initiatives and projects, and even to actions in favour of a higher civic engagement. On the contrary, they just hide a sort of “digital click-activism” that may end up trivialising civic engagement (Díez-Gutiérrez 2012).

Examining the emergence of skills overlooked by formal education implies going –to some extent– beyond the categories that structure our aprioristic knowledge; being attentive to new meaning structures in the observed learning processes. From the Aristotelian organisation of knowledge to the Universal Decimal Classification of our libraries, established knowledge has been arranged in tree-like structures using consolidated categories. Nevertheless, the early structuring of terms –as illustrated by the development of linguistic skills– progresses according to a dense reticular topology (not treelike) in which the dominant categories are constituted by virtue of an emergent connectivity with the rest of the semantic network (Nematzadeh & al., 2014). This property can be applied to the general emergence of knowledge or, as in our case, the learning of skills beyond formal education (Díaz-Nafría, 2017). Hence, the possibility of detecting it requires paying attention to the utterances of the subjects themselves. For this purpose, our study case, contextualised in the face-to-face training of teachers supported by virtual means and social networks, is also focused on the semantic analysis of participants’ utterances according to open categories and attentive to the topological features of the corresponding semantic network.

The object of the learning under study, aimed at increasing the teaching skills of teachers engaged in vocational training for employment, in the territorial context of a deep economic and employment crisis, is of particular interest for our research. In this context, the learners are compelled, on the one hand, to civic engagement concerning the creation of innovative and inclusive social processes; on the other, to the reflection of the very learning processes mediated by digital means in connection with the socio-economic reality. This peculiarity has enabled us to explore the capacity of ubiquitous learning in the generation of a critical cybercitizenship.

## 2. Materials and methods

### 2.1. Case study

The present study case is part of the project “Learning ecologies in multiple contexts: analysis of expanded learning and citizenship building projects” (ECOEC), which is framed within the Spanish national research plan and developed by a consortium integrated by six universities and other external collaborators. ECOEC project as a whole has explored the skills developed in the context of social networks and cyberspace through the comparative study of several expanded learning projects.

The study case carried out by a team from the University of León has been developed sequentially through the

observant participation of three training processes, developed in groups with homogeneous socio-cultural and demographic profiles along three consecutive years starting in 2014. The course under study, part of the curriculum of a vocational training center for employment located in León (Spain), is devoted to the lifelong learning of teachers (preferably in unemployment situation) and oriented to the “teaching of vocational training for employment”. Regarding the socio-economic situation and the realities of the labour market, the local context represents within Europe one of the most adverse scenarios in urgent need of economic and occupational change, which is particularly relevant for our study.

The population involved in the study case embraces 78 adults including trainees and teacher (52.5% men and 47.5% women); aged between 32 and 56 years old; holding higher education degrees (72%) and either a vocational training qualification or secondary school diplomas (28%). More than the half of them had worked over eight years (59.5%), almost the rest two years at least (35.5%), and only a small rate had worked less than one year (5%).

In order to foster the situation of ubiquitous learning, the following virtual tools were used: virtual classrooms (Moodle, Edmodo and Google-Classroom), shared storage and editing space (Google Drive, Pinterest, Isuu), social networks (Facebook, Twitter, LinkedIn, YouTube e Instagram), virtual agenda (Evernote) and Flipped-Classroom. They facilitated the effective linkage between the formal and informal learning environments.

**This endeavour to recover common resources and goods such as water, forests, collective services, etc., should be now extended to the field of knowledge, ideas, and digital assets. We live in an era in which each person is called upon to participate and share her own knowledge in the collective co-creation of lifestyles and spaces of freedom. That is why we must be alert to the tendency to appropriate these commons by the dominant capitalist institutions.**

Regarding the design of the study case, it has been framed within a mixed research model (qualitative and quantitative). It has enabled a deeper understanding and closer approach to the subject of study from a comprehensive perspective of open and complex exploration (Denzin & Lincoln, 2011; Flick, 2010; Stake, 2005). For that purpose, we carried out a triangulation strategy (Cook & Reichardt, 2005) that combines the qualitative and quantitative approaches to the gathering and analysis of data (Creswell & Plano, 2007; Hernández, Fernández, & Baptista, 2010). This has offered us better opportunities to move closer to the issues tackled in the study case through the integration of the perception narrated by the participants themselves, which increased in some way the sense of the quantitative results, as well as the higher consistency and intelligibility of the phenomena observed. In addition, this concurrent triangulation strategy made it possible to confirm, correlate and verify the quantitative and qualitative data simultaneously gathered (Pereira, 2011).

The “issues” or exploratory dimensions (Stake, 2009) used in this study case are the following four:

- 1) Criteria enable the acknowledgment of the ubiquitous formation of informal and incidental learning fostering the development of participative, dialogic, democratic, socio-communicative, digital, cognitive and emotional skills that facilitate the move towards autonomy.
- 2) Processes and digital tools of social mediation established in the learning development through the usage of transformative means and resources and its consequences regarding learning, development of soft skills and management of tacit knowledge.
- 3) Patterns of participation and engagement in the processes of shared and collective knowledge building that can be acknowledged in the network spaces analysed, and the mode in which it contributes to the building of a critical subjectivity that shapes engaged citizenship.
- 4) Modes of interaction of the discourses generated by the subjects in the contexts of citizen participation, in connection with their own experiences, everyday life and the social problems of its environment, which trigger social cooperation and civic commitment.

Table 1. Research instruments used, indicating the acronyms used in the text	
Instrument/Acronym	Description
<b>Observation (OB)</b>	It was sequentially carried out by three researchers throughout 20 non-consecutive sessions of five hours each, during 100 hours over the three training courses.
<b>Questionnaire (QU)</b>	It was applied to the 78 participants. Designed through a revision process carried out by evaluators, it was composed of open ended and closed questions using the Osgood scale.
<b>Interviews (IN)</b>	Carried out with eight key informants, using on-site and on-line interviews concerning the issues of the studies case.
<b>Discussion Groups (DG)</b>	Three discussion groups were organised (two with different participants and another with experts) about the issues as triggers for dialogue.
<b>Digital Field Diary:</b> - Individual (iDFD) - Shared (sDFD)	They were elaborated daily by the participants in digital form with personal contributions. This instrument had two variants: a. Individual Digital Field Diary: elaborated by each participant in digital format. All participants did one. b. Shared Digital Field Diary: space where agreed text is built collaboratively. Three were developed.

The data gathering was conducted from 2015 to 2017 using the research instruments described in Table 1.

## 2.2. Analytic tools

The following tools were used in the processes of analysis and interpretation of data:

A) Analysis of the semantic network comprised of the expressions used by the participants themselves during the exploration process and accumulated in textual form in the individual and collective field diaries as well as in the open ended questions from the questionnaires. Such analysis is based on the meaning relation established by the subjects in their own texts (Drieger, 2013; Díaz-Nafría, 2017). In so far as the sentence formed by the speaker implies a unit of sense, the mere syntactic co-occurrence of words (grouped in sets of derivative words) in the space of a sentence establishes a semantic linkage that can be explored in terms of the frequency of such links (Jakson & Trochim, 2002). In short, the greater or lesser occurrence of terms and links between terms has facilitated the examination of the relevance of different categories and the links between them concerning the established “issues”. At the same time, the formation of semantic networks in the texts analysed with “small-world” or “scale-free” characteristic structures, whose pertinence has been statistically proved (Figure 1), enables the visualisation of both the categories effectively used in the generic articulation of utterances and the grouping of verbal categories circumscribed by the dealing with specific issues (Barabasi, 2002; Díaz-Nafría, 2017). Hence, the semantic network analysis has been structured in the following phases:

- Text refinement, getting rid of those elements not corresponding to (textually) expressed utterances for which a meaningful syntactic-semantic treatment could not be performed.
- Quantitative analysis of the texts by means of the application of computational linguistics “KH Coder” which enables the analysis of the semantic network in terms of the semantic links observed in the texts through the adjacency distance in sentences (Higuchi, 2016; Anzai & Matsuzawa, 2013).
- The iterative process of relevant terms refinement according to its significance for the analysed issues that enables reviewing the aprioristic categorisation.
- Co-occurrence mapping extraction of the semantic networks derived from the open-ended questions of the questionnaires and the individual and collective digital field diaries.

b) Discourse analysis (Ibáñez, 1986; Demazière & Dubar, 2004; Alonso, 1998; Conde, 2009; Gibbs, 2012) applied to the discussion groups and interviews are generating hypotheses about the implicit dimensions and semantic spaces. It is focused on discovering the set of possible associations or groupings of expressions which, at a symbolic level, organise the semantic field and the “threads of discourse” that establish links among expressions and meanings.

c) The process of codification, classification, and discovery of new categories and “issues” not initially envisaged. This enabled the organising of data to produce conclusions and a general understanding of the study case through two stages:

- Open-ended codification: identifying emergent categories from the reading of the data and the statistical relevance observed in the semantic network obtained through the network analysis described above. It makes possible the development of new data approaches and a comparison among them.

• Selective codification: reduction of the set of emergent categories and “issues” from the intensive analysis of the relations between central issues and the rest of the linked categories. It can be identified through the study of conceptual centrality and the determination of conceptual grouping that is proper to the scale-free networks (Jackson & Trochim, 2002; Nematzadeh & al., 2014).

At the same time, the research process had a strong democratic and critical character. It was facilitated by the contrast of the findings with the participants in two research sessions, as well as with international specialists from Santa Elena State University (Ecuador), the Copperbelt University (Zambia) and Autonomous University of Mexico City (Mexico), who took part in the national investigation for comparative purposes. It allowed us to check the validity and reliability of the study as well as to add nuances and fine-tune to the interpretations obtained.

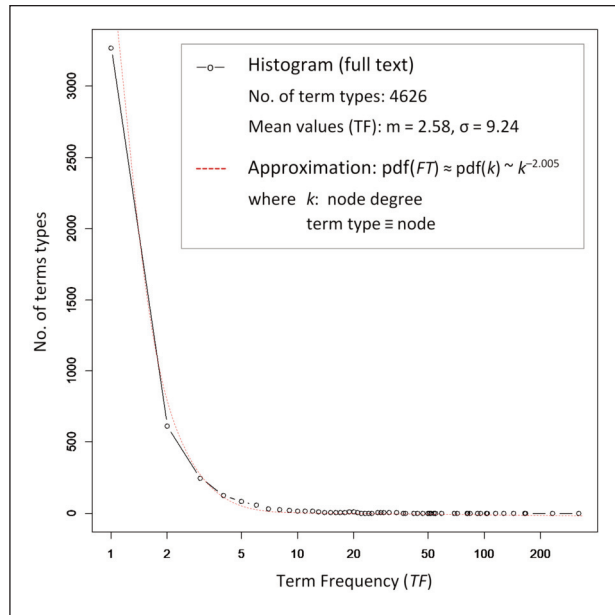


Figure 1. Frequency distribution of terms for a collective field diary.

### 3. Results

The following is a summary of the evidence that clarifies the results obtained, using the abbreviations given in Table 1 referring to the research instruments used. An excerpt of textual evidence grouped per each research issue is provided in 4 tables (available in figshare at the links given below). This evidence, corresponding to participants' own expressions, has been translated by the authors from the original source in Spanish.

The technological tools employed, mentioned above, facilitated the informal and incidental learning in the on-site spaces as well as in the online spaces beyond the traditional classroom (iDFD: <https://goo.gl/r1ZRCa>). They generated an ubiquitous process (DG: <https://goo.gl/6LP2G2>) “anywhere” and at “anytime”, in which the participants could increase the development of participative, dialogical, and democratic skills (IN-b: <https://goo.gl/ztzf8v>), as well as socio-communicative, digital, cognitive and emotional ones (issue-1). It was made possible through the interaction with the learning group and the teacher (IN: <https://goo.gl/Kt7ns6>), and through the stronger connection with social reality offered by the social media on a continuous and permanent basis (iDFD: <https://goo.gl/CBkBoS>). It is also worth mentioning that the methodology applied to the training was consistent with the tools employed, mutually reinforcing each other (IN-a: <https://goo.gl/uAVxJT>).

The digital skills acquired gradually in the use of open access technological tools enabled the development of soft skills and the management of tacit knowledge (IN, iDFD and DG-a: <https://goo.gl/hdym8>). But at the same time, these have made it possible to join the process of digital social mediation (issue-2) that facilitate the linkage among communication, life, and society. They generate new practices of citizen participation in other social and vital spheres through experiences of technological appropriation and empowerment that have brought about democratising logics in its contexts (OB: <https://goo.gl/hT8ZZt>). This has also been recognised in the results of the questionnaires [QU] which mostly state the potential for democratising horizontality in the knowledge collectively built and socially shared. Indeed, the assessment of the fostering of digital skills obtains the highest mean score 3.7/4 [QU] with statistically significant differences concerning other skills explored.

The results indicate that a part of the disaffection with traditional learning is related to its de-contextualisation concerning the problems of everyday life, the disconnection between formal and non-formal contexts, the primacy of a packed and discipline-compartmentalised discourse and the prevalence of reading and writing as learning channel par excellence (iDFD: <https://goo.gl/r83GPX>).

In Figures 2 and 3, the results of the semantic network analysis applied to the digital field diaries (co-occurrence network as described in the methodological part) can state in both semantic networks how explicit “knowledge”, the “book”, the “teacher”, and even the “subject” occupy peripheral positions. It denotes that the discourses of the

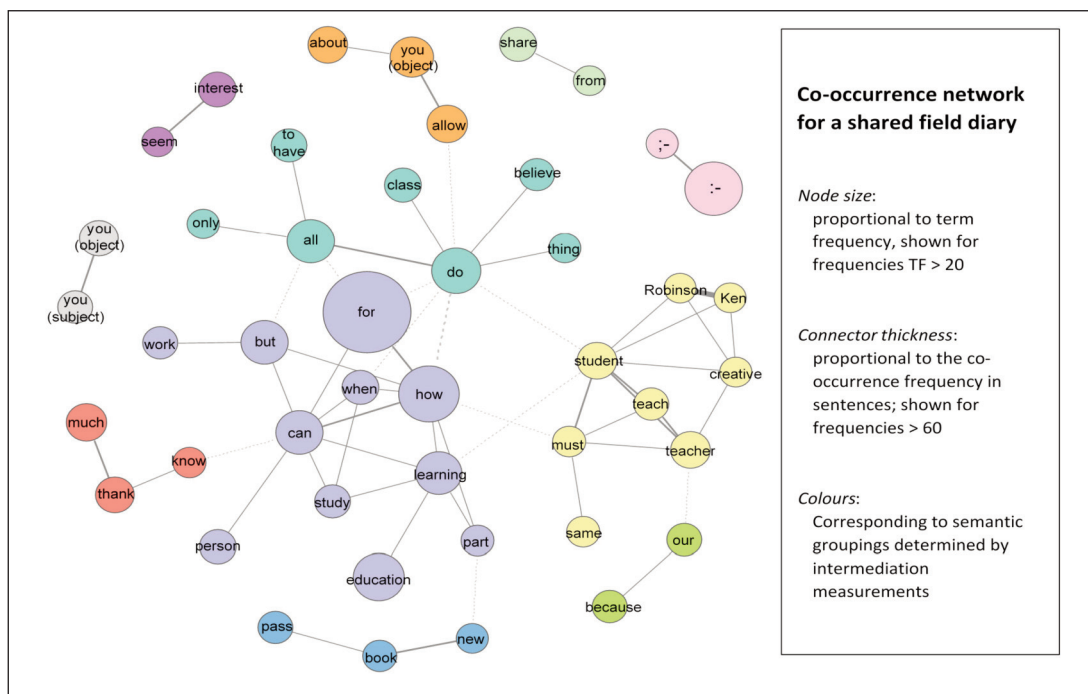


Figure 2. Co-occurrence network for the sDFD. The terms of the network correspond to the original Spanish ones used in the participants' own expressions.

participants themselves mirror a gradual detachment from these more traditional means as central tenets of the teaching/learning process, though not banishing them into oblivion since they are still present.

They give way to a type of learning that is more autonomous, continuous and grounded in reality and the context (as much the vital as the virtual context), in which they cohabit (Marin, Negre, & Pérez 2014). On the other hand, as emergent categories, it is observed that what is contextualised (“for”, “how”, “when”) “activity/doing” is transformed into a semantic field which articulates with maximal centrality the meaning of both the individual and collective expressions.

The use of ubiquitous technologies together with a participative methodology and the teacher's pedagogical approach has facilitated a collaborative and critical learning (OB: <https://goo.gl/vEwaFG>). For the identification of the collaborative learning, it has been considered that it takes place whenever all participants were committed to the goal of the working group generating a positive, non-competitive interdependence (Barkley, Cross, & Major, 2005).

This form of interaction has enabled learners to experience interdependence, shared relation and collaborative knowledge building as well as a democratic and horizontal framework in the conformation of that expanded socio-educational space (OB: <https://goo.gl/DVkr7v>). Therefore, participants claim that the ubiquitous learning must boost a critical and emancipating social knowledge for life (issue-3), beyond the classroom, which will undoubtedly contribute to the building of committed citizenship (OB and DG: <https://goo.gl/JXHEBn>). This has created a good bonding and a strong motivation for participants (<https://goo.gl/4ASaMZ>). The ubiquitous and expanded learning, experienced from a cooperative approach based on continuous collaboration, supported by multiple technologies, even caused the effect of a critical modification of the curriculum, reconstructing it collaboratively through student participation. At the same time, this learning has promoted a critical perspective on the reality of its environment and the social engagement beyond the classroom, as well as a better atmosphere and more solidarity within the group.

The capacity of projecting these skills to other areas and in the “digital life” has been appreciated in participant's discourses (DG-b and OB: <https://goo.gl/KM61sW>), acknowledging the necessity of both the online and on-site knowledge dialogue for the multicultural and changing environments in which they are living. This has facilitated the boosting of democratic scenarios and social engagement (iDFD: <https://goo.gl/WuUoqt>) in the building of enlarged citizenship (issue-4), faced with a society that promotes disintegration, inequality, and growing disenchantment with democratic institutions. The teacher himself expressed his satisfaction with this projection beyond the classroom, of the participative dynamic, of the building of a critical community that is also solidary. Nevertheless, the results

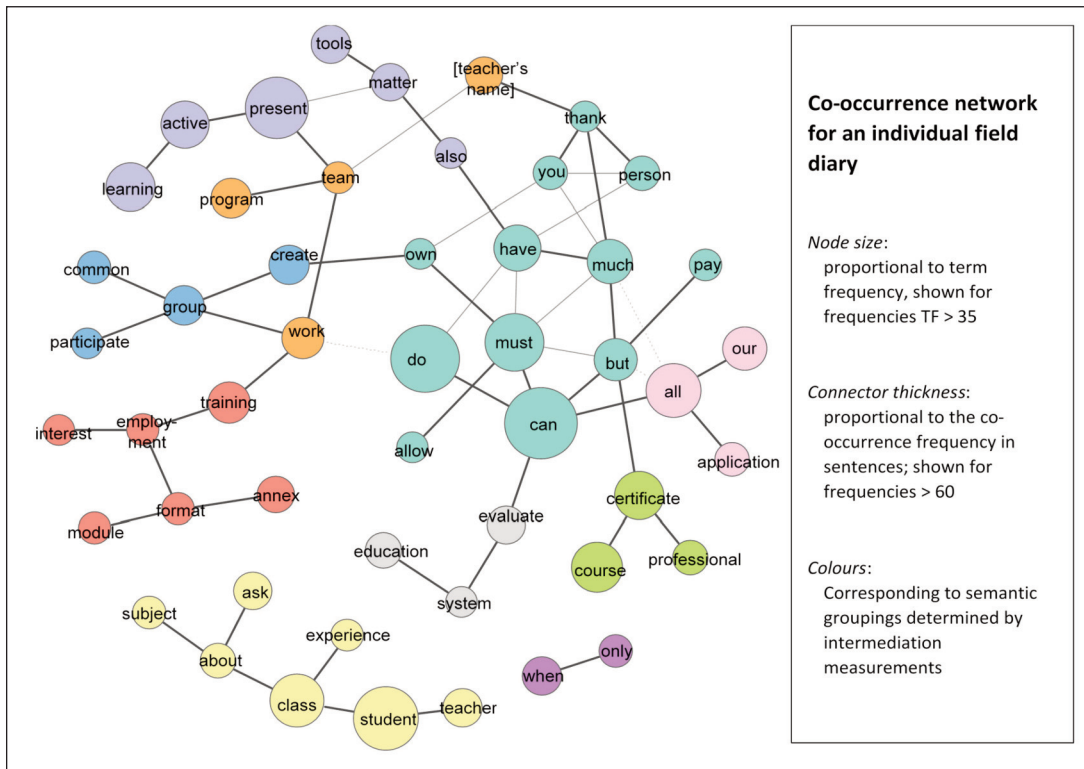


Figure 3. Co-occurrence network for the iDFD. The terms of the network correspond to the original Spanish ones used in the author's own expressions.

of the questionnaires-[QU] show a statistically significant difference (with 90% confidence) assessing more positively the fostering of digital skills than the democratic ones (11% difference).

#### 4. Discussion and conclusions

Ubiquitous learning (issue-1) is constituted by continuous learning of multiple subjects in multiple situations anywhere and at any time, from different foci and perspectives, and invisibility for the process of traditional teaching-learning (Cope & Kalantzis, 2010). It has allowed for the integration of the digital world and social networks in the communicative and vital social environment of the participants.

The digital tools (issue-2) and the social networks have enabled contextualised critical learning experiences that coupled with a committed social projection generate new perspectives about learning to define it as social, distributed, and critical. It is assumed that in these new digital environments learning is much more horizontal since it is built and shared in a collective and to some extent democratic manner (Fueyo, Braga, & Fano, 2015). From the perspective of "distributed cognition", knowledge does not reside exclusively in the person who is teaching but is scattered in the group, in the objects, and in the tools that are handled (Putnam & Borko, 2000; Siemens & Weller, 2011). From this perspective, the ubiquitous technology (which embraces the interaction among people, collectives, and networks, mediated by devices ranging from mobile telephones to alternative social networks of the deep Internet) facilitates the horizontal, interconnected, and collective knowledge (Specht, Tabuenca, & Ternier, 2013). The latter enables the building of a critical cyber citizenship, provided that the process is coupled with a reflection that, despite having a collective nature, is conscious (Fuchs, 2016).

According to the results obtained in the present study case, which is part of a comparative study in 12 diverse educational contexts as mentioned above, we have ascertained that a proper combination of mobile technology, contents, and the trainee's willingness to learn are key factors to create learning ecologies beyond the formal and on-site traditional context that we are used to. These ecologies integrate virtual and interactive multiple spaces (Rubia & Guitert, 2014) and facilitate a continuous learning which is no longer dependent on times, boundaries, and physical space (Burbules, 2014). However, it has been shown that the mediation of the teacher in the user to

the producer of shared and critical meaning transition is required to engage participants.

This ubiquity of the learning processes enables the reframing of the traditional model of academic education. The use made of mobile devices and social networks is rather small. Whenever it is done, it comes from individual initiative, since part of the teaching staff is still reluctant to incorporate social networks into education (Chiecher, 2014; Espuny, Leixa, & Gisbert, 2011; Gutiérrez, Palacios, & Torrego, 2010; Rochefort & Richmond, 2011).

Ubiquitous learning in this study case has gone hand-in-hand with a model of on-site and dialogical teaching/learning; generating thus a type of learning we can call “mixed” (Downes, 2008). This mixed process (designated by Jorrín-Abellán & Stake (2009) as “ubiquitous paradigm” in which formal and informal spaces are connected, have changed—in this study case—the way the participants understand the learning process (as much in the access and dissemination of information as in the teaching methodology, both planned collaboratively and critically). This change has modified the relationship between the teacher and the learner, building a more horizontal and democratic interaction (Burbules, 2014) as has been observed in the study of the semantic network through the displacement of the categories used in the discourse concerning the traditional educational categories. This categorical shift suggests at the same time that, before the classic tree-like organisation, one should be alert to the semantic relation from which new centralities emerge.

We have also noted the educational potential originated by the integration of this approach of ubiquitous learning in the acquisition of “soft skills” related to the capacity for self-development: The use of transformative means and resources, the strengthening of social cooperation, the resolution of cognitive and social challenges, and the enhancement of civic commitment and functional learning generated by expanded learning (issue-3). It was also verified that such a mode of learning could be transformed into an instrument for the empowerment of people, collectives, and social movements.

This has not only enabled the pulling down of the so called “classroom walls” bringing about ecologies of ubiquitous learning (Specht & al., 2013; Cope & Kalantzis, 2010), but it has also caused mutations in the official curriculum (Miller, Shapiro, & Hilding-Hamann, 2008). At the same time, it has boosted a global, interactive, and collaborative educational design with a transversal curriculum more open to the contemporaneous digital culture. It breaks its excessively disciplinary structure (Fueyo, Braga, & Fano, 2015), integrating issues emerging from the real and vital problems of the participants’ environments (Dussel, 2014). This tended to reduce student disaffection, as they found a more gratifying source in the learning produced outside the classroom (Buckingham, 2008).

In conclusion, we can state that the ubiquitous and expanded learning implies three shifts: the dilution of space-time boundaries, and also the curricular and methodological ones; the access and production of knowledge in a more horizontal and participative manner; and, the growing capacity for network interaction and shared effort. Moreover, we confirm that the use of Internet and social networks facilitate not only expanded and continuous learning but also social and civic participation and engagement, which constitutes one of the fundamental training goals.

Beyond these ubiquitous and expanded learning ecologies (which contribute to the overcoming of the “training digital divide” characterised by fragmented knowledge and de-contextualisation from real life problems), we need to discuss the social and political role that might be played by this emerging cyber-society, as it has arisen in our research (issue-4). That is, whether it actually facilitates a critical and emancipating social knowledge which contributes to the building of a citizenship committed to a fair and egalitarian social development for all, as posed by Fueyo (2011) or Fueyo, Braga y Fano (2015). On the contrary, it is ultimately bringing about what has been called “voyeurism 2.0” (Caldevilla, 2010; Sánchez & Poveda, 2010; Bringué & Sádaba, 2011): namely, the use of networks mostly for contacting, self-exhibition, and knowledge about other people’s lives (Echeburúa & De-Corral, 2010).

The Internet and social networks are not only transforming the process of teaching and learning, as we have observed here, but they are also making a deep impact on the way we connect and communicate. The participants in the research have perceived that they also “have politics” since they also channel particular forms of power and authority. They prioritise and influence ways of thinking, relationships, and life styles (Fuchs, 2016; Díaz-Nafría & al., 2014), which gradually redraw the imaginable, and indeed probable, horizon (Díez-Rodríguez, 2003). They have democratised the access to information, but a large part of the population suffers “digital divide”, particularly elderly people, rural populations or those on a low income, etc. They have enabled us to move from being consumers to producers of content, relations or proposals through tools which are increasingly more simple and more accessible (blogs, social networks, etc.). Only a few nodes control the most of the information flow in the



cyberspace (Díaz-Nafría, 2017) which in the current capitalist society meet the economic and ideological interests of those who control them (Fuchs, 2016; Díez-Gutiérrez, 2012).

For that reason, expanded learning, as an open, collaborative, democratic and engaged learning, needs to be boosted and supported consciously, if we really want future generations to be not only consumers but also collaborative and critical producers in a shared social world. It was fostered in our case as much by the teacher as by the demands of the socio-economical context. In less pressing contexts, the teacher's task in the awakening of consciousness will undoubtedly have to be more active but, in some way, the endeavour is restoring the idea of "commons" in the new digital culture claiming. As Garcés (2010) points out, digital goods and knowledge are common heritage. This endeavour to recover common resources and goods such as water, forests, collective services, etc., should be now extended to the field of knowledge, ideas, and digital assets. We live in an era in which each person is called upon to participate and share her own knowledge in the collective co-creation of lifestyles and spaces of freedom. That is why we must be alert to the tendency to appropriate these commons by the dominant capitalist institutions (Hardt & Negri, 2009).

Time will tell whether these "soft skills" which, as we have observed, are brought about by the ubiquitous and expanded learning are fully integrated into a global project that facilitates the empowerment of peoples, collectives, and social movements. It is in our hands moving forward towards the realisation of the utopia of a more egalitarian, solidary, fair and collaborative cyber society. This is the challenge because the future is built with the networks we weave ourselves (Díez-Gutiérrez, 2012).

### Funding agency

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### References

- Alonso, L.E. (1998). El análisis sociológico de los discursos. In L.E. Alonso (Ed.). *La mirada cualitativa en sociología* (pp. 187-220). Madrid: Fundamentos. (<https://goo.gl/ZGxsj6>).
- Anzai, S., & Matsuzawa, Ch. (2013). Missions of the Japanese National University Corporations in the 21st Century: Content analysis of mission statements. *Academic Journal of Interdisciplinary Studies*, 2(3), 197-207. <https://doi.org/10.5901/ajis.2013.v2n3p197>
- Barabási, A. (2002). *Linked: The new science of networks*. Cambridge, Ma: Perseus Publishing. (<https://goo.gl/EaH38m>).
- Barkley, E., Cross, K.P., & Major, C.H. (2005). *Collaborative learning techniques*. San Francisco: Jossey-Bass.
- Bernabé, D. (2017). Fascismo gif. Cómo la ultraderecha se apropió de la cultura de Internet. *La Marea*, 2017-05-24. (<https://goo.gl/LeN0EI>).
- Bringué, X., & Sádaba, C. (2011). *Menores y redes sociales*. Madrid: Foro Generaciones Interactivas. (<https://goo.gl/FsxS17>).
- Buckingham, D. (2007). *Beyond technology: Children's learning in the age of digital culture*. Cambridge, Ma: Polity Press. (<https://goo.gl/aNcpLs>).
- Burbules, N.C. (2014). El aprendizaje ubicuo: Nuevos contextos, nuevos procesos. *Entramados*, 1, 131-134. (<https://goo.gl/X9IIAZ>).
- Caldevilla-Domínguez, D. (2010). Las redes sociales. Tipología, uso y consumo de las redes 2.0 en la sociedad digital actual. *Documentación de las Ciencias de la Información*, 33, 45-68. (<https://goo.gl/Hu52YS>).
- Chiecher, A. (2014). Un entorno virtual, dos experiencias. Tareas académicas grupales y socialización de emociones en Facebook. *Revista Interuniversitaria de Formación del Profesorado*, 79(28.1), 129-143. (<https://goo.gl/Qt7hEg>).
- Cobo, C., & Moravec, J.W. (2011). *Aprendizaje invisible. Hacia una nueva ecología de la educación*. Barcelona: Universitat de Barcelona. (<https://goo.gl/c5oiGY>).
- Conde, F. (2009). *Análisis sociológico del sistema de discursos*. Madrid: Centro de Investigaciones Sociológicas. (<https://goo.gl/vho6hJ>).
- Cook, T., & Reichardt, Ch. (2005). *Métodos cualitativos y cuantitativos en investigación evaluativa*. Madrid: Morata. (<https://goo.gl/HmZkcP>).
- Cope, B., & Kalantzis, M. (2010). *Ubiquitous learning*. Urbana and Chicago: University of Illinois Press. (<https://goo.gl/JfqqVWB>).
- Demazière, D., & Dubar, C. (2004). *Analyser les entretiens biographiques*. Quebec: PUL. (<https://goo.gl/kWidJS>).
- Denzin, N. K., & Lincoln, Y. S. (2011). *The SAGE handbook of qualitative research*. Thousand Oaks, Calif.: Sage. (<https://goo.gl/ci97pb>).
- Díaz-Nafría, J.M. (2017). Cyber-Subsidiarity: Towards a global sustainable information society. In E.G. Carayannis, D.F. Campbell, & M.P. Efthymiopoulos (Eds.), *Handbook of cyber-development, cyber-democracy and cyber-defense*. Berlin: Springer. [https://doi.org/10.1007/978-3-319-06091-0\\_39-1](https://doi.org/10.1007/978-3-319-06091-0_39-1)
- Díaz-Nafría, J.M., Alfonso, J., & Panizo, J. (2015). Building up e-participatory decision-making from the local to the global scale. Study case at the European higher education area. *Computers in Human Behavior*, 47, 26-41. <https://doi.org/10.1016/j.chb.2014.09.004>
- Díez-Gutiérrez, E.J. (2012). Tecnologías de la Información, ¿motor de participación o de dominación? *International Review of Information Ethics*, 18(12), 101-107. (<https://goo.gl/bz76re>).
- Díez-Rodríguez, A. (2003). Ciudadanía cibernética. La nueva utopía tecnológica de la democracia. In J. Benedicto & M.L. Morán (Ed.), *Aprendiendo a ser ciudadanos* (pp. 193-218). Madrid: Injuve. (<https://goo.gl/9jg1YS>).

- Downes, S. (2008). *The future of online learning: Ten years on*. Moncton: Stephen Downs. (<https://goo.gl/kCbJCK>).
- Drieger, P. (2013). Semantic network analysis as a method for visual text analytics. *Procedia - Social and Behavioral Sciences*, 79(2013), 4-17. <https://doi.org/10.1016/j.sbspro.2013.05.053>
- Dussel, I. (2014). ¿Es el currículum escolar relevante en la cultura digital? Debates y desafíos sobre la autoridad cultural contemporánea. *Archivos Analíticos de Políticas Educativas*, 22(24), 1-21. <https://doi.org/10.14507/epaa.v22n24.2014>
- EC (2010). *Una estrategia para un crecimiento inteligente, sostenible e integrador. COM(2010) 2020 final*. Bruselas: Comisión Europea. (<https://goo.gl/3K1EZq>).
- Echeburúa, E., & De-Corral, P. (2010). Adicción a las nuevas tecnologías y a las redes sociales en jóvenes: Un nuevo reto. *Adicciones*, 22(2), 91-96. (<https://goo.gl/WVzsrZR>).
- Flick, U. (2010). *Introducción a la investigación cualitativa*. Madrid: Morata. (<https://goo.gl/PfeRtk>).
- Fuchs, Ch. (2016). *Critical Theory of Communication*. London: University of Westminster Press. (<https://goo.gl/jgz7bk>).
- Fueyo, A. (2011). Comunicación y Educación en los nuevos entornos. ¿Nativos o cautivos digitales? *Ábaco*, 2-3(68-69), 22-28. (<https://goo.gl/Hz8v2T>).
- Fueyo, A., Braga, G., & Fano, S. (2015). Redes sociales y educación: El análisis socio-político como asignatura pendiente. *Revista Interuniversitaria de Formación del Profesorado*, 82, 119-130. (<https://goo.gl/UUadG2>).
- Gallego-Lema, V., Muñoz-Cristóbal, J.A., Arribas-Cubero, H.F., & Rubia-Avi, B. (2016). Aprendizaje ubicuo: Un proceso formativo en educación física en el medio natural. *Relatec*, 15(1), 59-73. <https://doi.org/10.17398/1695-288X.15.1.59>
- Garcés, M. (2010). Dar que pensar. *Espai en Blanc*, 7-8, 41-53. (<https://goo.gl/gellZT>).
- Gibbs, G. (2012). *El análisis de datos cualitativos en investigación cualitativa*. Madrid: Morata. (<https://goo.gl/Faei2Q>).
- Gutiérrez, A., Palacios, A., & Torrego, L. (2010). Digital tribes in the university classrooms. [Tribus digitales en las aulas universitarias]. *Comunicar*, 34(XVII), 173-181. <https://doi.org/10.3916/C34-2010-03-17>
- Hardt, M., & Negri, A. (2009). *Commonwealth*. Cambridge, MA: Harvard University Press. (<https://goo.gl/wWvt2B9>).
- Hernández, R., Fernández, C., & Baptista, M.P. (2010). *Metodología de la investigación*. México: McGraw Hill.
- Higuchi K. (2016). *KH Coder 3 Reference Manual*. Kioto (Japan): Ritsumeikan University. (<https://goo.gl/CeWSeQ>).
- Jackson, K.M., & Trochim, W.M. (2002). Concept mapping as an alternative approach for the analysis of open-ended survey responses. *Organizational Research Methods*, 5(4), 307-36. <https://doi.org/10.1177/109442802237114>
- Jorrín-Abellán, I.M., & Stake, R.E. (2009). Does ubiquitous learning call for ubiquitous forms of formal evaluation? An evaluand oriented responsive evaluation model. *Ubiquitous Learning*, 1(3), 71-82. (<https://goo.gl/QMhxGR>).
- Marí, V.M. (2010). Tecnologías de la información y gobernanza digital. Los usos ciudadanos de Internet en el espacio local de Jerez de la Frontera. *Historia Actual Online*, 21, 173-187. (<https://goo.gl/R1zypC>).
- Miller, R., Shapiro, H., & Hilding-Hamann, K.E. (Eds.) (2008). *School's over: Learning spaces in Europe in 2020*. Sevilla: Joint Research Center. (<https://goo.gl/6LkGvJ>).
- Nematzadeh, A., Fazly, A., & Stevenson, S. (2014). A cognitive model of semantic network learning. *Proceedings of the 2014 Conference on Empirical Methods in Natural Language Processing (EMNLP)*, 24, 244-254. (<https://goo.gl/aMhMJn>).
- Nonaka, I., & Takeuchi, H. (1995). *The knowledge-creating company*. New York: Oxford University Press.
- Pereira-Pérez, Z. (2011). Los diseños de método mixto en la investigación en educación: Una experiencia concreta. *Educare*, XV(1), 15-29. (<https://goo.gl/1dQypr>).
- Putnam, R. (2009). *The myth of digital democracy*. New Jersey: Princeton University Press. (<https://goo.gl/GxxcSU>).
- Putnam, R.T., & Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning. *Educational Researcher*, 29(1), 4-15. <https://doi.org/10.3102/0013189X029001004>
- Rendueles, C. (2016). La ciudadanía digital. ¿Ágora aumentada o individualismo postmaterialista? *Revista Latinoamericana de Tecnología Educativa*, 15(2), 15-24. <https://doi.org/10.17398/1695-288X.15.2.15>
- Rocheffort, B., & Richmond, N. (2011). Conectar la enseñanza a las tecnologías interconectadas. ¿Por qué es importante? La perspectiva de un diseñador pedagógico. *Revista de Universidad y Sociedad del Conocimiento*, 8(1), 200-216. (<https://goo.gl/QKktna>).
- Rubia, B., & Guitert, M. (2014). Revolution in education: Computer support for collaborative learning. [¿La revolución de la enseñanza? El aprendizaje colaborativo en entornos virtuales]. *Comunicar*, 42(XXI), 10-14. <https://doi.org/10.3916/C42-2014-a2>
- Siemens, G., & Weller, M. (Coords.) (2011). El impacto de las redes sociales en la enseñanza y el aprendizaje. *Revista de Universidad y Sociedad del Conocimiento*, 8(1), 157-163. (<https://goo.gl/VTG1iq>).
- Specht, M., Tabuenca, B., & Ternier, S. (2013). Tendencias del aprendizaje ubicuo en Internet de las cosas. *Campus Virtuales*, 2(2), 30-44. (<https://goo.gl/UAJ0dH>).
- Zemos-98 (Ed.) (2012). *Educación expandida*. Sevilla: Gestión Creativo Cultural. (<https://goo.gl/3YG4Vm>).

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# Teen videos on YouTube: Features and digital vulnerabilities

Los vídeos de los adolescentes en YouTube: Características y vulnerabilidades digitales

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## ABSTRACT

As a mechanism for social participation and integration and for the purpose of building their identity, teens make and share videos on platforms such as YouTube of which they are also content consumers. The vulnerability conditions that occur and the risks to which adolescents are exposed, both as creators and consumers of videos, are the focus of this study. The methodology used is content analysis, applied to 400 videos. This research has worked with manifest variables (such as the scene) and latent variables (such as genre or structure). The results show that there are notable differences in style among the videos according to the producer of the message, and indicate that the most consumed videos are located around four thematic axes (sex, bullying, pregnancy and drugs) and that the referents as audiovisual content creators are the YouTubers. Everything points to problems in using the same language, including audiovisual language, as adolescents. This paper provides evidences of the convenience of using their codes so that this sector of the population see risks and conditions of vulnerability that they seem not to perceive according to their audiovisual creations in which they do not protect their identity, among other features.

## RESUMEN

Como un mecanismo de participación e integración social y con el propósito de construir su identidad, los adolescentes realizan y comparten vídeos en plataformas como YouTube, de la que también son consumidores de contenido. Las condiciones de vulnerabilidad que tienen lugar y los riesgos a los que se exponen los adolescentes, tanto como creadores como consumidores de vídeos, son el objeto central de este estudio. La metodología utilizada es el análisis de contenido, aplicado a 400 vídeos. Se ha trabajado con variables manifiestas (como el escenario) y latentes (como el género o la estructura). Los resultados muestran unas notables diferencias de estilo entre los vídeos a tenor del productor del mensaje e indican que los vídeos más consumidos se sitúan alrededor de cuatro ejes temáticos (sexo, acoso, embarazo y drogas) y que los referentes como creadores de contenido audiovisual son los «youtubers». Todo apunta a la existencia de problemas a la hora de utilizar el lenguaje, también audiovisual, de los adolescentes. Este trabajo proporciona evidencias de la conveniencia de emplear sus códigos para que este sector de la población se percate de los riesgos y de las condiciones de vulnerabilidad que parecen no percibir según sus creaciones audiovisuales, en las que, entre otras características, no protegen su identidad.

## KEYWORDS | PALABRAS CLAVE

Adolescence, YouTube, digital vulnerability, video, risks, sexuality, bullying, drug.  
Adolescencia, YouTube, vulnerabilidad digital, vídeo, riesgo, sexualidad, acoso, droga.



## 1. Introduction, current situation, aims, and objectives

The subject matter of this research is audiovisual content directed at teens, made by them themselves or by other agents, through the YouTube platform. To this end, vulnerability (Fuente-Cobo, 2017) and the risks associated with the consumption, preparation, and exposure of this type of content by this sector of the population (O'Keeffe & Clarke-Pearson, 2011) are taken to be key factors.

The electronic environment has affected the traditional problems of adolescence due to the "increase in online communication, the existence of wider peer networks and greater opportunities for self-presentation and exploring identity" (Subrahmanyam, Greenfield, & Michikyan, 2015: 126). When studies continue to warn of an increased percentage of conditions that favour addition to Internet use, especially by young people (Bleakley, Ellithorpe, & Romer, 2016), it becomes essential to know how adolescents interact with the digital environment (Blomfield & Barber, 2014). It is a medium in which phenomenon such as cyber bullying (Edwards, Kontostathis, & Fisher, 2016) develop, with video being one of the tools used (Álvarez-García, Barreiro-Collazo, & Nuñez, 2017).

This research continues the line focusing on the risks and defined by the studies, led by Sonia Livingstone, on EU-Kids Online. It also progresses specifically as regards situations of vulnerability occurring in both the creation and the consumption of audiovisual material by teens.

The risks children are exposed to include viewing inappropriate material. The content broadcast on YouTube is of a very diverse nature and has very varied, not always positive, intentions. According to the study by Livingstone and others (2014), almost one-third of adolescents state they have seen material they did not like, the most frequent incident being exposure to violent or pornographic videos. In the work of Yarosh and others (2016), which records and compares the topics appearing on two platforms like YouTube and Vine, it is observed there is a greater percentage of videos containing sexual, violent or obscene content appearing on the latter. Exposure to certain commercial offerings broadcast on networks such as YouTube, Facebook and Twitter also entails a risk, as studies such as the research by Barry and others (2015) demonstrate that children can be exposed through these media to content that is advertising alcoholic beverages.

Another cause for concern is the level of credibility underage viewers can lend to the content of certain videos, especially if on delicate subjects such as health. Studies on this subject already exist as regards accuracy in videos on anorexia, analysed by Syed-Abdul and others (2013), and the lower visibility achieved by health videos from reliable sources, conducted by Karlsen, Borrás-Morell, and Traver-Salcedo (2017). These make it necessary to reassess the appropriateness of protocols to filter this type of material, so as to prevent certain content from becoming highly circulated and popular. This is all the more relevant when research such as that conducted by López-Vidales and Gómez-Rubio (2015) indicates that institutional videos (in this case dealing with the issue of drugs) are not widely accepted or circulated among teens.

As regards vulnerability, teenagers are a particularly vulnerable group since while they are aware of the risks of the Internet, which they consider a space open to an unknown public, they have a different perception of environments such as social networks. These they deem safer, private and far removed from the dangers linked to the Internet (Martínez-Pastor, Sendín-Gutiérrez, & García-Jiménez, 2013; Sabater, 2014). This perception, according to Blais and others (2008), is underpinned by the fact that applications which enable direct, individualised communication, such as instant messaging, increase trust and the feeling of privacy even though these applications are operating in an online environment. Moreover, there is a dissociation between the negative experiences endured by the adolescents in the social media environment and their assessment of the risk posed by social network usage (De-Frutos & Marcos, 2017).

In order to explore identity construction and social integration and participation, teenagers make videos that they share and spread through social networks or specific platforms such as YouTube, which enable their creations to achieve a wider circulation. The repercussions from the dissemination of these videos involve all types of spheres. As they are experimenting with new forms of communication and audiovisual styles, the spheres range from social (Abisheva & al., 2014) or cultural (Bañuelos, 2009; Chau, 2010) areas (Misoch, 2014) to public health issues (Wartella & al., 2016), political topics (Dias-da-Silva & Garcia, 2012) and economic matters (Ritzer & Jurgenson, 2010), among others.

Jenkins, Ford, and Green (2015) state that whenever a teen creates some Harry Potter fan fiction, the value of the Harry Potter brand rises. Every time a fan shares a Star Wars parody on YouTube, the actions of that narrative world in the kingdom of intangible assets goes up (Jenkins, Ford, & Green, 2015: 10). These actions affect areas as diverse as economics or culture.

YouTube is a platform with content specifically aimed at teens, and accessing this social network is one of the first things individuals do when starting out in the digital domain, regardless of the device they use to connect to it (Protégeles, 2014). Given that adolescents do not only consume audiovisual material they have created, in this study, we will also deal with productions disseminated by other agents such as the media or YouTubers. The latter have a great influence on teenagers, as can be seen from the conclusions of the study by McRoberts and others (2016), as young people imitate the creative guidelines of the professionals, although they do not have video editing or position themselves using meta data as YouTubers do.

Participation levels by YouTube users differ greatly. In some areas, such as politics, huge consumption of materials on this subject does not go hand in hand with mass production of videos. In this case, passive users predominate, and participation frequently involves sharing videos that have already been broadcast on other media such as the television (Berrocal, Campos, & Redondo, 2014) rather than users creating their own content. More active prosumers who record and share audiovisual messages are found elsewhere, in cultural or social areas, for example. YouTube even becomes an efficient tool for education and, moreover, for dissemination of science, through live transmission of academic events (Franco, 2017), among other possibilities.

**The study does not seek to detect extremes such as cyber bullying. However, it does confirm, from the beginning, that situations of vulnerability that occur for adolescents both in creating and consuming audiovisual material fall with four major thematic areas: sex, drugs, bullying, and pregnancy.**

In essence, we will analyse the content of the videos targeting teenagers in order to determine the subjects of interest, discover who the authors are, look at the communication styles and thus define the risks they are exposed to. In addition, the vulnerability factors there are, both in the consumption and in the creation and dissemination of these materials by the adolescents themselves, an active sector of the population in all aspects: a creative, participative and consumer population (García-Jiménez, Catalina-García, & López-de-Ayala, 2016). The aims and objectives of this paper are:

- a) To identify the situations of vulnerability and the underlying risks in the videos made and disseminated by the teens themselves.
- b) To analyse the characteristics of the audiovisual creations in terms of focus and their style-genre, as well as other aspects relating to the level of impact based on indicators such as the number of views, “likes” or “dislikes”, and comments generated.
- c) To determine what content (subjects) is aimed at teens on YouTube, how it is constructed, based on genre, focus and structure, and what the most consumed content is (number of “likes”, views or comments). Given that YouTube videos are accessed through popularity filters, the aim is to analyse the suitability of the content, the risk of consuming material that is not suitable for children or the treatment of certain subjects which may lead to risky situations. In this case, we will take especially into account two types of audiovisual content producers which are held out as being fundamental when defining the communicative reality of teens: YouTubers, given that their productions achieve high levels of popularity, and the media, whose videos are created by audiovisual media professionals but have a lower impact on YouTube.

## 2. Material and methods

YouTube is a channel that is conducive to spreading messages as it has become a forum of global dimensions (Jiménez & Gaitán, 2013). The aim is to find out through this study what type of audiovisual works, aimed at adolescents, are available on this social network, which we can class as such given that it allows teens and young people to reflect their interests and contact peers who share them (Lenhart & al., 2015). The producers of the videos include the adolescents themselves, who demand their space and part of the limelight (Aguaded & Sánchez, 2013).

## 2.1. Methodology

In this study, the content analysis technique has been used, which enables comparable and repeatable quantitative data, as well as the subsequent comparison of the data to identify if certain factors or “clusters” link or separate them. As these are audiovisual units, a record has been made, in accordance with the terminology from Igartua (2006), of both manifest variables (such as the setting, whether children appear in the video and whether their identities have been protected) and latent variables (structure, genre or focus, among others).

Although adapted to a certain extent, the protocol and indicators used are based on previous work such as that by Yarosh and others (2016) focusing on the audiovisual content published by adolescents and the study by Halliday (2004) into the modal structure of the videos. The action protocol which has enabled the formal, narrative, thematic or evaluative components of the audiovisual content to be studied has been verified at various stages of the research.

Finally, the variables recorded in this study were: link and address of the video, consultation dates (discovery and viewing of the video by the researchers) and date of the publication of the video, description (whether it contains it or not), category (according to YouTube categories), title, authorship, user (who hosts the video), duration, genre or format (expanded values from Yarosh & al., 2016), appearances by children (and if their identity is protected or not in the cases where they appear), structure (declarative, imperative or interrogative; based on Halliday, 2004), focus (positive, negative, neutral or undetermined), presence of content related to vulnerability and risks, subject, space of the representation (private or public), three variables relating to the interaction it generates (amount of “likes”, “dislikes” and comments) and, lastly, number of views (relevance).

## 2.2. Definition of the sample

The audiovisual content studied was determined through a selection process involving tags. The study aimed to analyse videos created by teens, although it did not want to be limited to these authors. However, to facilitate discovery of the videos produced by them, a search was conducted on the YouTube website, using speech marks, for the expression “teenager videos” (more specific for this purpose than if only the term “teenagers” had been used).

Although platforms like YouTube promote active users, who do not only limit themselves to consuming content but also produce content (Ritzer, Dean, & Jurgeson, 2012), it is no simple matter for teens to gain visibility and achieve an impact for the content they upload to YouTube. Taking into account the objectives of the study, it was decided to arrange the results of the search based on the number of views—even though this made it more difficult for videos created by teens to form part of the selection—and an initial sample of 100 videos were defined. Although studies such as that by Karlsen, Borrás-Morell, and Traver-Salcedo (2017) mention the suitability of implementing other variables in the internal YouTube search mechanism, which makes it easier to arrange in order and discover content through approaches other than number of views or popularity of the video (such as the credibility of the source), it was decided to choose the number of views. It is the clearest current manner to ensure the videos analysed have been disseminated to at least a certain extent.

The language factor also conditioned the sample, as it focused on audiovisual content in Spanish. With the aim of analysing units that were fairly current, the sample comprised videos hosted on YouTube as of 2010. This time margin was left since, in order to reach a relevant number of views, videos tend to need to be present for a certain amount of time on the platform, although among the 100 videos of the initial sample, only two had such an old upload date.

Once the aforementioned conditioning factors had been applied, the variables of the analysis protocol were tested. This made it possible to refine certain values as well as to rule out some variables (whose results would not be material due to the diversity of their authorship) and the subjects present in the 100 videos making up the initial sample were recorded.

After locating four redundant subjects (sex, drugs, bullying, and pregnancy) in this initial group, the sample was increased to 400 videos. However, the 300 new videos incorporated into the study focused exclusively on these recurring subjects based on the tags “teenagers sex”, “teenagers drugs”, “teenagers pregnancy” and “teenagers bullying”. As can be seen in the scientific literature, these subjects are in tune with the lines established by the researchers in the area: sexual relations (sex, pregnancy), consumption of harmful substances (alcohol or drugs, among others) and situations of bullying and violence. Studies such as those of Livingstone and others (2014), Barry and others (2015), López-Vidales and Gómez-Rubio (2015), Edwards, Kontostathis and Fisher (2016), Yarosh and others (2016) and Álvarez-García, & Barreiro-Collazo and Nuñez (2017) corroborate that the aforementioned subjects are of great interest to teenagers.



### 3. Analysis and results

#### 3.1. Authorship

As has been commented, this study opted to determine the authorship of the video (the original author). This task presents some difficulties, and therefore it is not surprising that the first category should be “unknown” with a score of 25.3%. When the content of the video or the information provided by the user hosting it did not make it possible to specify the authorship, it was opted to record it as “unknown”. In the second position were videos uploaded by the media, representing 20.3%, followed by 15.1% of videos where the author is a teenager.

Furthermore, there are two intermediate groups, such as YouTubers (most of whom are young), who represent 8.8% of the total number of videos analysed, and public institutions, which essentially disseminate campaigns to raise society’s awareness of any aspect deemed to be of interest. Adults or professionals (10.3%) upload fewer videos than teenagers, that demonstrates that YouTube is a field mostly dominated by young people.

#### 3.2. Conditions of vulnerability

##### 3.2.1. Appearances by children

In this study, an analysis has also been made of how children appear, although it has to be borne in mind that in certain age groups it is difficult to determine the possible year of birth of the people appearing in the audiovisual content. In this case, it can be observed that it is in the videos authored by teenagers where their identities are least protected (68.3%). It also highlights the fact that in both private and public institutions there is a high percentage of documents in which it is possible to see children whose identities have not been protected (60.7% and 56.3%, respectively). In contrast, videos from the media are those that, to a greater extent (28%), respect protection of the children’s identities (that is, a technique is used to prevent them from being recognised, either by using shadow or by distorting or pixelating the images). However, they contain a higher percentage (35.4%) of forbidden for children.

<b>Authorship</b>	<b>Protected child</b>	<b>Unprotected child</b>	<b>No child appears</b>
<b>Communication media</b>	28.0%	35.4%	36.6%
<b>Teenager</b>	6.7%	68.3%	25.0%
<b>Public institution</b>	0.0%	56.3%	43.7%
<b>Other</b>	2.4%	39.0%	58.6%
<b>YouTuber</b>	0.0%	17.1%	82.9%
<b>Private institution</b>	0.0%	60.7%	39.3%
<b>Unknown</b>	0.0%	48.0%	52.0%

##### 3.2.2. Authorship and space

Following the YouTubers, where spaces considered to be private (80%) are shown in their videos, it is teen-authored videos which, to a greater extent, are recorded in private locations (31.7%) as compared to public places (16.7%). This takes into account that in 28.3% of cases there is a mixture of both types. The videos made by the media essentially present public spaces (the category includes television studios) given that they represent 82.9% of the videos belonging to these entities. Besides, the videos made by institutions, there is consistency in those from public institutions (33.3% in public spaces compared to 44.4% in non-detectable spaces), which use private locations rarely. Private institutions mainly record in public places (52.6%).

##### 3.2.3. Authorship and vulnerability

One of the crucial elements has to do with issues linked to vulnerability. In this respect, 26.67% of the teen-authored videos tackle in one way or another the subject of bullying, which features as the issue paid the most attention. The next most important issues for this group are drugs (21.67%) and pregnancy (21.67%). Fourth place is taken by the videos containing sexual content (13.33%). No relevant figures were offered by the remaining aspects. In comparative terms, when the author of the video is a YouTuber, the content is fundamentally of sexual nature (42.86%), followed at some distance by content related to drugs or pregnancies (in both cases, 11.43%). Sexual content (37.80%) is also deemed a more prominent subject in videos from the media. In the second place, the audience can access media-made videos that address the question of bullying (23.17%), followed by those that reflect some aspect of pregnancy (18.29%).

### 3.3. Characteristics of the audiovisual content

#### 3.3.1. Authorship and genre

Compared to the rest of the groups or institutions analysed, teenagers show great diversity as regards the genre

Table 2. Subjects addressed by the different authors of the videos

Subjects	Teenager	Unknown	Private institution	Public institution	Communication medium	Other	YouTuber	Total
<b>Bullying</b>	26.67%	18.00%	25.00%	27.78%	23.17%	12.20%	5.71%	20.50%
<b>Drug consumption</b>	1.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%
<b>Sexual content</b>	13.33%	33.00%	42.86%	12.96%	37.80%	41.46%	42.86%	30.75%
<b>Drugs</b>	21.67%	19.00%	21.43%	18.52%	15.85%	24.39%	11.43%	18.75%
<b>Pregnancy</b>	21.67%	19.00%	0.00%	22.22%	18.29%	4.88%	11.43%	16.25%
<b>Family integration</b>	1.67%	2.00%	3.57%	7.41%	1.22%	2.44%	8.57%	3.25%
<b>Social integration</b>	3.33%	3.00%	3.57%	3.70%	1.22%	2.44%	2.86%	2.75%
<b>Other</b>	10.00%	4.00%	0.00%	5.56%	1.22%	4.88%	14.29%	4.75%
<b>Health</b>	0.00%	2.00%	3.57%	0.00%	1.22%	7.32%	2.86%	2.00%
<b>Vulnerability by genre</b>	0.00%	0.00%	0.00%	1.85%	0.00%	0.00%	0.00%	0.25%
<b>General total</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

of the videos they upload to YouTube. “Choreographies” predominate, representing 38.3% of the total number of their videos, followed by “remixes” (25%). Next, and in a less significant proportion of their videos, are “selfies” and “fun stuff”, both with 13.3%. From this data, it is possible to deduce the recreational purpose of the audiovisual offerings from the adolescents. These results were not repeated in the other categories. YouTubers show a fundamental inclination towards selfies, amounting to 54.3%, while the media opt mainly (91.5%) for items of journalism.

### 3.3.2. Authorship and structure

The majority of the teen-authored videos have a declarative structure (55.7%) followed at some distance by those using the imperative style (27.9%). In the videos from the media, practically all have a declarative structure (89.0%). The same is true with those made by YouTubers, although more than ten percentage points less (77.1%). It could be stated that the predominant style of these three groups is far from an imperative structure (videos that include orders that lead to action) or an interrogative/reflexive structure (videos that pose questions or stir the conscience), as they opt more for an aseptic (or declarative) model offering.

### 3.3.3. Authorship, focus, and duration

Another aspect addressed has to do with the focus (positive, negative, neutral or indeterminate) of the videos depending on authorship. In this respect, it can be observed that the videos made by public institutions, in the first place, and by teenagers, in second place, are those offering a more significant percentage of positive messages (in which there is an attempt to solve a problem).

There is symmetry between the positive and neutral focus (those videos which just explain the situation) in the videos made by the media or YouTubers. Those with the most negative tone (when solutions to the problem are rejected without any alternative solutions being contributed) of all the videos are those made by YouTubers, even though they constitute a minority (11.4%) of their videos.

Concerning duration, all the authors show their predilection for videos lasting between 1 and 10 minutes (this range accounts for over 74% of the videos). If we subdivide this category into two (videos lasting 1-5 minutes and those lasting 5-10 minutes), while the YouTubers mostly opt for videos between 5-10 minutes long, the remaining authors have a preference for videos lasting 1-5 minutes.

## 3.4. Popularity of the videos and degree of interaction

### 3.4.1. Authorship and “likes”

According to the results obtained, videos by teenagers, which represent 15% of the total number of audiovisual items, only account for 10.10% of the “likes” detected. As regards videos made by YouTubers, although these only represent 8.75% of the total number of videos, they have 62.33% of the “likes”. By contrast, the videos from the media, which constitute the highest percentage of videos with known authorship (20.50%), only account for 1.78% of “likes”. In short, it can be stated that videos by YouTubers generate a very positive reaction, from which it can be deduced there is a greater ability to get a reaction (possibly of forming some community) and, to a certain extent, to click with the tastes and trends of the audience. This would occur to a lesser extent in the case of videos made by teenagers, although there are some noteworthy results.

### 3.4.2. Authorship and significance

Concerning the data obtained on “likes” and in absolute terms, teen-authored videos are the most viewed: their 60 videos received nearly 13 million views. They are followed by the YouTubers, who obtained, with just 35 videos, 8 million views (representing the highest ratio). Meanwhile, the media, despite having more videos (82), obtained approximately half of the number of views received by the teenagers’ videos (6.6 million). Once again, it is possible to observe the greater significance in percentage terms of the videos made by YouTubers. However, the total figure obtained by the teenagers’ offerings gives clear proof of their ability to create an impact.

Another way of defining their significance comes from analysing the number of views. Those demonstrating the most success are those made by YouTubers, as almost half of their videos are among those with over one million visits. In the case of videos made by one or several teenagers, 45% of the documents analysed had 25,000 views. However, the sum of the remaining categories, that is, videos obtaining more than 25,000 visits, make up the remaining 55% of their videos.

**Table 3. Popularity of the video in relation to the authorship**

Author	General Percentage "Likes"	General Percentage Authorship
Teenager	10.10%	15.00%
Unknown	11.15%	25.00%
Private institution	6.83%	7.00%
Public institution	2.22%	13.50%
Communication medium	1.78%	20.50%
Other	5.59%	10.25%
YouTuber	62.33%	8.75%
General total	100.00%	100.00%

### 3.4.3. Authorship and comments

The videos causing a greater impact, regarding comments generated, are those made by YouTubers, which stand out from the rest as regards both absolute data (67.66%) and relative data when comparing authorship

**Table 4. Significance of the video and its link to authorship**

Author	Sum of Significance	Number of videos
Teenager	12715730.2	60
Unknown	6898146.6	100
Private institution	6722431.8	28
Public institution	2559365.9	54
Communication medium	6657482.1	82
Other	4401154.7	41
YouTuber	8071367.4	35
General total	48025678.7	400

category percentages. This is the only category analysed in which this occurs. In the remaining categories, the percentage of comments is lower, relatively speaking, than the authorship percentage recorded. In the case of teenagers, it accounts for 7.27% of the total number of comments. Also, in absolute terms, they are of the “unknown” authorship category. These data show it is videos by YouTubers which elicit support, debate or also censure from their audience.

## 4. Discussion, conclusions, and limitations

This study aims to gain more knowledge about the ways teenagers interact in the digital environment. The study does not seek to detect extremes such as cyber bullying. However, it does confirm, from the beginning, that situations of vulnerability that occur for adolescents both in creating and consuming audiovisual material fall with four major thematic areas: sex, drugs, bullying, and pregnancy.

Authorship has been demonstrated to be the variable which most explains the results, with the results obtained by institutional videos (e.g., campaigns to prevent the use of drugs or about anorexia) being totally at odds with the audiovisual content created by teenagers and young people. The studies on the potential factors for risk and anxiety among children and teenagers also indicate the central nature of empathy. Videos made by young people in emotional situations which are familiar and seem authentic trigger the strongest empathy among the young. In contrast, the study has also established that institutional videos are not greatly accepted or circulated among the teenage public. YouTube is a field chiefly dominated by young people with young codes.

The content study conducted not only complements the conclusions of the research into the subject and quantifies its potential impact (videos by adolescents are watched twice as much, and those by YouTubers are those with the greatest impact). It also shows the gaps between codes are profound, which makes audiovisual communication between adolescents, young people, and adults extremely difficult. Evidently, the recreational purpose of the

audiovisual offerings by teenagers (the genres of “choreographies”, “remixes”, “selfies” and “fun stuff” in general) contrasts with the seriousness of the adults’ audiovisual offerings. However, above all, it is lack of perception about the conditions of vulnerability (perhaps only slightly less on the subject of bullying) which shows how the codes of adults and those of teenagers as regards identifying risk differ very widely. Videos created by teenagers offer a greater percentage of items in which it is possible to observe unprotected children and teenagers; the videos by YouTubers and teenagers are those recorded to a greater extent in private settings as opposed to public places.

In all the subjects, the predominating structure is an aseptic, declarative, model structure. It is only in the case of videos on bullying where there is a significant percentage (almost half) of videos that address the audience in an imperative manner or call upon the recipients in a questioning (interrogative) or reflexive fashion. If to this we add a clear predominance of positive or neutral videos, we get a picture of a lack of problematisation, that is, a scenario of normality. The adolescents “take for granted” certain codes which, in circumstances of vulnerability, should perhaps become problematised.

In sum, the outlined research into content shows videos made by young people for young people which are entertaining, normalised, unconcerned with potential situations of vulnerability and present themselves, perhaps dangerously, as simple spaces for asserting their adolescence.

The criticism that can be made of this conclusion is that we do not know to what extent young people can de-codify as having been made as an investment or for “fun” a good part of the material which can be seen as “dangerous” from the perspective of its content. Moreover, much less can we calculate the effect its message, as they de-codify it, may have. From our point of view, future research should look deeper into this issue.

For example, the General Aggression Model (GAM) of Anderson and Bushman (2001) makes it possible to predict, with considerable empirical support, aggressive conduct by children. It accepts that both the personal variables and the situation-related variables (including exposure to violence in the real world, in the media or online) influence the current internal state of an individual (Kirsh, 2010; 2012). In the same vein, a more thorough research should work towards a Model of Adolescent and Youth Vulnerability that includes the viewing of unsuitable material among the risks to which children and adolescents are exposed. What we seek to do is to identify the codes of the interaction of teenagers in the digital environment and the content liable to cause potential vulnerability, although the materialisation of situations of vulnerability is reliant on a complex maze of variables.

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### References

- Abisheva, A., Kiran-Garimella, V.R., García, D., & Weber, I. (2014). Who watches (and shares) what on YouTube? And when?: Using twitter to understand YouTube viewership. In *Proceedings of the 7th ACM International Conference on Web Search and Data Mining*, 593-602. <https://doi.org/10.1145/2556195.2566588>
- Aguaded, I., & Sánchez, J. (2013). El empoderamiento digital de niños y jóvenes a través de la producción audiovisual. *AdComunica*, 5, 175-196. <https://doi.org/10.6035/2174-0992.2013.5.11>
- Álvarez-García, D., Barreiro-Collazo, A., & Nuñez, J.C. (2017). Cyberaggression among adolescents: Prevalence and gender differences. [Ciberagresión entre adolescentes: Prevalencia y diferencias de género]. *Comunicar*, 50(XXV), 89-97. <https://doi.org/10.3916/C50-2017-08>
- Anderson, C.A., & Bushman, B.J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science*, 12, 353-359. <https://doi.org/10.1111/1467-9280.00366>
- Bañuelos, J. (2009). YouTube como plataforma de la sociedad del espectáculo. *Razón y Palabra*, 69, 1-68. (<https://goo.gl/XJpyrz>).
- Barry, A., Johnson, E., Rabre, A., Darville, G., Donovan, K., & Efunbumi, O. (2015). Underage access to online alcohol marketing content: A YouTube case study. *Alcohol and Alcoholism*, 50(1), 89-94. <https://doi.org/10.1093/alcac/agu078>
- Berrocal, S., Campos, E., & Redondo, M. (2014). Media prosumers in political communication: Politainment on YouTube. [Prosumidores mediáticos en la comunicación política: El ‘politainment’ en YouTube]. *Comunicar*, 43(XXII), 65-72. <https://doi.org/10.3916/C43-2014-06>
- Blais, J., Craig, W., Pepler, D., & Connolly, J. (2008). Adolescents online: The importance of Internet activity choices to salient relationships. *Journal of Youth and Adolescence*, 37, 522-536. <https://doi.org/10.1007/s10964-007-9262-7>
- Bleakley, A., Ellithorpe, M., & Romer, D. (2016). The role of parents in problematic internet use among US adolescents. *Media and Communication*, 4(3), 24-34. <https://doi.org/10.17645/mac.v4i3.523>
- Blomfield, C.J., & Barber, B.L. (2014). Social networking site use: Linked to adolescents’ social self-concept, self-esteem, and depressed mood. *Australian Journal of Psychology*, 66, 56-64. <https://doi.org/10.1111/ajpy.12034>
- Chau, C. (2010). YouTube as a participatory culture. *New Directions for Youth Development*, 128, 65-74. <https://doi.org/10.1002/ya.376>
- De-Frutos, B., & Marcos, M. (2017). Disociación entre las experiencias negativas y la percepción de riesgo de las redes sociales en adolescentes. *El Profesional de la Información*, 26(1), 88-96. <https://doi.org/10.3145/epi.2017.ene.09>

- Días-da-Silva, P., & García, J.L. (2012). YouTubers as satirists: Humour and remix in online video. *eJournal of eDemocracy and Open Government*, 4(1), 89-114. (<https://goo.gl/PHM6UI>).
- Edwards, L., Kontostathis, A., & Fisher, C. (2016). Cyberbullying, race/ethnicity and mental health. *Media and Communication*, 4(3), 71-78. <https://doi.org/10.17645/mac.v4i3.525>
- Franco, E.C. (2017). Redes sociales libres en la universidad pública. *Revista Digital Universitaria*, 18(1). (<https://goo.gl/5ptkf1>).
- Fuente-Cobo, C. (2017). Públicos vulnerables y empoderamiento digital: El reto de una sociedad e-inclusiva. *El Profesional de la Información* 26(1), 5-12. <https://doi.org/10.3145/epi.2017.ene.01>
- García-Jiménez, A., Catalina-García, B., & López-de-Ayala-López, M.C. (2016). Adolescents and YouTube: Creation, participation and consumption. *Prisma Social*, n. extra, 60-89. (<https://goo.gl/qNifJN>).
- Halliday, M.A.K. (2004). *An Introduction to Functional Grammar*. London: Edward Arnold.
- Igartua, J.J. (2006). *Métodos cuantitativos de investigación en comunicación*. Barcelona: Bosch.
- Jenkins, J., Ford, S., & Green J. (2015). *Cultura transmedia, la creación de contenido y valor en una cultura en red*. Barcelona: Gedisa.
- Jiménez, C., & Gaitán, B.N. (2013). *Análisis de los factores que motivan a los estudiantes de la Universidad Autónoma de Occidente a difundir contenidos virales en la Red*. Cali (Colombia): Universidad Autónoma de Occidente. (<https://goo.gl/0jP6tH>).
- Karlsen, R., Borrás-Morell, J., & Traver-Salcedo, V. (2017). Are trustworthy health videos reachable on YouTube? - A study of YouTube ranking of diabetes health videos. In *Proceedings of the 10th International Joint Conference on Biomedical Engineering Systems and Technologies (BIOSTEC 2017)* - Volume 5: Healthinf, 17-25. <https://doi.org/10.5220/0006114000170025>
- Kirsh, S.J. (2010). *Media and youth: A developmental perspective*. Malden (Massachusetts): Wiley-Blackwell.
- Kirsh, S.J. (2012). *Children, adolescents, and media violence: A critical look at the research*. Thousand Oaks, CA: Sage.
- Lenhart, A., Smith, A., Anderson, M., Duggan, M., & Perrin, A. (2015). *Teens, technology and friendships*. Pew Research Center. (<https://goo.gl/PHq81a>).
- Livingstone, S., Kirwil, L., Ponte, C., & E. Staksrud, E. (2014). In their own words: What bothers children online? *European Journal of Communication*, 29(3), 271-288. <https://doi.org/10.1177/0267323114521045>
- López-Vidales, N., & Gómez-Rubio, L. (2015). Análisis y proyección de los contenidos audiovisuales sobre jóvenes y drogas en YouTube. *Estudios sobre el Mensaje Periodístico*, 21(2), 863-881. [https://doi.org/10.5209/rev\\_ESMP.2015.v21.n2.50889](https://doi.org/10.5209/rev_ESMP.2015.v21.n2.50889)
- Martínez-Pastor, E., Sendín-Gutiérrez, J.C., & García-Jiménez, A. (2013). Percepción de los riesgos en la red por los adolescentes en España: Usos problemáticos y formas de control. *Análisis*, 48, 111-130. (<https://goo.gl/ao3odb>).
- McRoberts, S., Bonsignore, E., Peyton, T., & Yarosh, S. (2016). Do it for the viewers!: Audience engagement behaviors of young YouTubers. In *Proceedings of the The 15th IDC International Conference on Interaction Design and Children*, 334-343. <https://doi.org/10.1145/2930674.2930676>
- Misoch, S. (2014). Card Stories on YouTube: A New Frame for Online Self-Disclosure. *Media and Communication*, 2(1), 2-12. (<https://goo.gl/VV5OsRt>).
- O'Keeffe, G., & Clarke-Pearson, K. (2011). The impact of social media on children, adolescents, and families. *Pediatrics*, 127, 800-804. <https://doi.org/10.1542/peds.2011-0054>
- Protégeles (Ed.) (2014). *Menores de edad y conectividad móvil en España: Tablets y smartphones*. (<https://goo.gl/pBaMvV>).
- Ritzer, G., & Jurgenson, N. (2010). Production, Consumption, Prosumption: The nature of capitalism in the age of the digital 'prosumer'. *Journal of Consumer Culture*, 10(1), 13-36. <https://doi.org/10.1177/1469540509354673>
- Ritzer, G., Dean, P., & Jurgenson, N. (2012). The Coming of Age of the Prosumer. *American Behavioral Scientist*, 56(4), 379-398. <https://doi.org/10.1177/0002764211429368>
- Sabater, C. (2014). La vida privada en la sociedad digital. La exposición pública de los jóvenes en Internet. *Aposta*, 61, 1-32. (<https://goo.gl/0HRnyl>).
- Subrahmanyam, K., Greenfield, P., & Michikyan, M. (2015). Comunicación electrónica y generaciones adolescentes. *Infamérica*, 9, 115-130. (<https://goo.gl/uvP9R7>).
- Syed-Abdul, S., Fernandez-Luque, L., Jian, W.S., Li, Y.C., Crain, S.,... Liou, D.M. (2013). Misleading health-related information promoted through video-based social media: Anorexia on YouTube. *Journal of Medical Internet Research*, 15(2), e30. <https://doi.org/10.2196/jmir.2237>
- Wartella, E., Rideout, V., Montague, H., Beaudoin-Ryan, L., & Lauricella, A. (2016). Teens, Health and Technology: A National Survey. *Media and Communication*, 4(3), 13-23. <https://doi.org/10.17645/mac.v4i3.515>
- Yarosh, S., Bonsignore, E., McRoberts, S., & Peyton, T. (2016). YouthTube: Youth video authorship on YouTube and Vine. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*, 1423-1437. <https://doi.org/10.1145/2818048.2819961>

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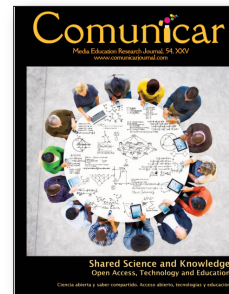
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# Parental mediation of the Internet use of Primary students: Beliefs, strategies and difficulties

Mediación parental del uso de Internet en el alumnado de Primaria: creencias, estrategias y dificultades

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## ABSTRACT

The use of the Internet by children at an increasingly early age today constitutes a major challenge for families and schools, as well as affecting educational and social policy. This is a qualitative piece of research that analyzes parents' beliefs, everyday practices and the difficulties they face in teaching their children the benefits and risks inherent in Internet use. The researchers used the discussion group technique, with four groups of parents of primary school children from four different schools. The results indicate that they share a pessimistic rather than an optimistic attitude towards Internet use among children in this age group, and perceive a number of difficulties when trying to foster children's responsible use of Internet. A wide range of parental control and mediation strategies were identified (laying down rules, organization of time and space for Internet use, limits and supervision (direct, agreed-upon, non agreed-upon and technical), along with various support strategies (parent and sibling modeling, diverse teaching strategies for stimulation and family communication) which, with the exception of technical supervision, they often use to educate their children and control their behavior in other areas, and which form part of their general parenting style. The conclusions point to the need to develop digital competence among parents, and there is some justification for educational intervention such as in promoting collaboration between families and schools.

## RESUMEN

El uso de Internet de los niños y las niñas a edades cada vez más tempranas constituye un reto para las familias, las escuelas y la política educativa y social en la actualidad. Se presenta una investigación cualitativa cuyo objetivo es analizar las creencias, prácticas cotidianas y dificultades que afrontan los padres y las madres cuando tratan de enseñar a sus hijos e hijas los beneficios y riesgos de Internet. Se ha utilizado la técnica de los grupos de discusión con cuatro grupos de madres y padres de alumnado de Educación Primaria de cuatro centros educativos. Los resultados indican que comparten una concepción más pesimista que optimista sobre el uso de Internet a estas edades y que perciben diversas dificultades cuando tratan de promover su uso responsable. Se identifican diversas estrategias de mediación parental de control: establecimiento de normas, organización espacio-temporal de límites y supervisión (presencial directa, consensuada, no consensuada y técnica) y de apoyo (modelado parental, entre hermanos y diversas estrategias instructivas, de estimulación y comunicación familiar) que, a excepción de la supervisión técnica, habitualmente utilizan para educarles o controlar su comportamiento en otras áreas formando parte de su estilo general de parentalidad. Las conclusiones apuntan la necesidad de desarrollar la competencia parental digital y algunas implicaciones para la intervención educativa como promover la colaboración entre la familia-escuela.

## KEYWORDS | PALABRAS CLAVE

Internet, beliefs, parental mediation, parental control, primary education, digital literacy, intervention, risks.  
Internet, creencias, mediación parental, control parental, educación primaria, competencia digital, intervención, riesgos.



## 1. Introduction

One of the biggest challenges faced by families, schools and social and educational policymakers today is to maximize the benefits and minimize the risks of Internet use among young children and teenagers. According to Livingstone & Helsper (2008), "mediation" refers to the parents' management of their children's relationship with media. From the perspective of social and educational intervention, effective parental mediation is seen as one of the several important actions for promoting children's safe and responsible use of Internet that also include campaigns to raise awareness, software tools to filter content, and the development of digital competence at schools (Bringué & Sádaba, 2009; Garmendia, Casado, Martínez, & Garitaonandia, 2013; Valcke, De-Weber, Van-Keer, & Schellens, 2011).

In the family setting, the way young boys and girls use media is one of the issues that most concerns parents today (Duggan, Lenhart, Lampe, & Ellison, 2015). Connell, Lauricella and Wartella (2015) have reflected on the debate among researchers around the fact that the ubiquitous nature of media leads to a distancing between family members (Turkle, 2011). Others that suggest that media are fundamental aspects of family life today that can influence how a family functions, for better or for worse (Takeuchi, 2011).

There are two complementary strands of research on parental mediation in Internet use in infancy (Livingstone & Helsper, 2008). The first identifies various typologies of parental mediation styles. Their sources of influence and their efficacy in reducing the risks posed by unsuitable Internet use (Garmendia, Garitaonandia, Martínez, & Casado, 2011; Garmendia & al., 2013; Kirwil, 2009; Livingstone, Haddon, Görzig, & Ólafsson, 2011; Livingstone & Helsper, 2008; Ofcom, 2014; Sonck, Nikken, & de Haan, 2013). These works emphasize that parental mediation is universal (Kirwil, 2009). Although mothers and fathers apply many different mediation strategies, they tend to prefer social mediation and the shared/co-use of Internet involving communication with their children and instructive mediation rather than just installing professional computer protection software tools to block undesirable content (Kirwil, 2009; Livingstone & Helsper, 2008; Ofcom, 2014). The results on effective parental mediation are contradictory: some works state that the most effective strategies are those which are restrictive, banning their children from any online interaction with their peers (Livingstone & Helsper, 2008). Others declare that the efficacy of parental mediation strategies is determined by the values promoted during the child's upbringing within a given sociocultural context (Kirwil, 2009).

The second approach by parental mediation researchers studies socialization practices that contribute to the formation of the beliefs, values and ethno-theories of the progenitors that affect infant media consumption and, more recently, on media literacy (Livingstone, Marsh, Plowman, Ottovordemgentschenfelde, & Fletcher-Watson, 2015). Sorbring (2014) found that the concerns of parents (N=798), regarding teenagers' (in this case, aged 13-15) use of Internet, was related to the parents' attitudes, knowledge, and experiences of Internet use, to their beliefs in their children's ability to use Internet, and to the use they made of it. The parents who showed greatest concern were those who were aware of the negative experiences suffered by their children on Internet, and who consider that the use of Internet during adolescence is positively related to their level of concern about issues such as searching for inappropriate information on the Net, losing friendships, being physically inactive or being exposed to potentially dangerous people or material that is disturbing or violent, although a parental perception of the maturity of their teenage children also figures.

Cheung (2010) studied 2,579 families with children ranging from 6 to 17 and found that parents' knowledge of how to use the Internet was a key factor in their supervision of their children's use of Internet and that mothers were more likely to assume this role. About half the parents expressed satisfaction with their ability to help their children to benefit from Internet use and protect them from the risks, whereas one-third were dissatisfied and acknowledged difficulties in protecting their kids. Parents' level of education, knowledge and a positive attitude towards Internet use, as well as adopting an authoritative parental style and maintaining good relations within the family, are positively associated with parents' skill in helping their children to benefit from the Internet and in protecting them from risk; however, parental satisfaction reduces as their children get older and they spend more time online.

Ihmeideh and Shawareb (2014) concluded that the style of upbringing played a fundamental role in promoting, or restricting, a child's exposure to Internet: when the parents adopted an authoritative style that combines a high level of support and control (laying down rules about Internet use and discussing them together, and encouraging them to talk freely about their online activities), it was more likely to stimulate Internet use than when parents adopted an authoritarian (low level of support and high level of control), permissive (high level of support, low level



of control) or negligent (low level of support and control) attitude, confirming the results in other works (Valcke, Bonte, De-Wever, & Rots, 2010; Valcke & al., 2011).

The majority of the research in Spain on parental mediation in children's Internet use (Bringué & Sádaba, 2009; Casas, Figuer, González, & Malo, 2007; Garmendia & al., 2013; INTECO, 2009; Álvarez, Torres, Rodríguez, Padilla, & Rodrigo, 2013; Padilla & al., 2015; Sureda, Comas, & Morey, 2010) has been based on surveys and focused mainly on the teenage phase. Some studies have combined quantitative methodologies via surveys and more qualitative methods, with the aim of investigating parental mediation of children's Internet use in the earlier stages of child development (Chaudron, 2015; Livingstone & al., 2015).

The aim of this research is to analyze the beliefs and daily practices of parents in Spain in promoting the responsible use of Internet by their children. The specific aims are: 1) To analyze parental beliefs on Internet use by primary school pupils; 2) To identify parents' mediation strategies; 3) To recognize the difficulties parents perceive in teaching responsible use of the Internet and in avoiding its dangers; 4) To detect the needs of parents in their mediation and draw practical conclusions for educational interventions aimed at helping families.

## 2. Methodology

This is a qualitative investigation that uses the group discussion technique to perform an in-depth analysis of the beliefs, daily practices and main difficulties that parents face when trying to teach their children how to use the Internet responsibly. This study does not aim to generalize its results but to respond to a need perceived by schools and parents for information, instruction and guidance on parental mediation in the use of Internet by primary school children.

**From the perspective of social and educational intervention, effective parental mediation is seen as one of the several important actions for promoting children's safe and responsible use of Internet that also include campaigns to raise awareness, software tools to filter content, and the development of digital competence at schools.**

The choice of schools was intentional and based on specific characteristics such as families with children in the third and sixth year of primary school in state or private state-funded schools who were aware of their children's use of Internet, families from urban and rural settings, immigrant and native families. The parents participated voluntarily and formed four groups (NG1=10, NG2=8, NG3=15 and NG4=11), they numbered 44 parents in total (37 women, 7 men), whose children were attending the third (aged 8-9) and sixth (aged 12-13) grades at four primary schools in the Guipuzcoa province of the Basque Country, in northern Spain. Two were state schools and two private state-funded schools. The sociocultural diversity of the families of students was greater at the two state schools; in terms of size, three of the four schools were secular, offering two classes per course while one of the private state-funded schools had four; one of the four schools was religious; two were located in rural and two in urban areas.

The procedure was to request parents' collaboration in the study through the head teachers and teacher-parents associations at the four centers for them take part in a debate on their role in their children's consumption of media through various screens. The questions posed to the parents were: 1) What positive and negative aspects do you believe consumption of media has at these ages? 2) How do you act about your children's consumption of media? 3) What do you believe are the main difficulties? This study only compiled information related to the parents' beliefs and mediation practices regarding their children's use of Internet. The Nvivo 10 software program was used to classify, analyze and synthesize the data obtained.

## 3. Results

### 3.1. Parental beliefs

The parents had positive and negative conceptions on the use of Internet at these ages, but the negative ones (70.55%) outweighed the positive (29.45%) by more than double. The main negative conception was the inappropriate use that their children could make of the Internet (30.13%), specific access to violent content (and to a lesser

extent, pornographic, stereotypical or drug-related). Another worry was the children's lack the maturity in dealing with content aimed at older children: "What worries me is that my nine-year-old daughter has hooked up with boys of 11 or 13, so she has access to the world that for her is fascinating, and now she wants a tablet to play online with some people, to play some war game. They want to have access to this older world which is still far beyond their understanding". Parents expressed concerns about the excessive amount of time spent online, and the inappropriateness of the time and place for doing so: "At Christmas, I was surprised to find that so many children send each other WhatsApp messages, often well after midnight".

A second set of concerns covered the negative consequences of using Internet (20.87%), especially the social ones (difficulties in communication ("people communicate worse"), misunderstandings, problems in relating to others, loss of direct face-to-face communication ("There's no conversation", "We have forgotten how to relate to each other, the day-to-day communication"), fewer opportunities to "learn to play together" as opposed to "playing on machines", the trend towards individualism and individualization, and the psychologies (isolation ("They don't listen"), dependence, lack of conversation, they get easily frustrated, lack of imagination, the sense of boredom if they are not online ("They don't know how to play" or "have fun"), bullying, invasion of privacy, consumption of pornography ("sexting"), frustrations, concern about stereotypes, lack of real positive role models on Internet, getting stigmatized if they do not connect to certain trendy social networks. These concerns were matched by those relating to academic performance ("They don't know how to write", spelling mistakes, low attention span, an excessive search for immediate gratification and lack of reflection, a lack of effort and perseverance when faced with difficult tasks (for example, in Maths) and the physical consequences (a more sedentary lifestyle, less inclination to do physical games or sporting activities).

Other parental concerns include the uncertainty generated by their children's use of Internet (17.59%) ("Right now I don't know how they use it, now they are joining groups, and the more they join, the better it makes them feel; it's not about how he uses it, but the stuff he is receiving"), the perception of their children being beyond their control (14.76%), ("I believe the problem is this, you give them a cell phone, but with the Internet connection, you give them freedom that you can no longer control... what they do is now beyond your control") and the risks they perceive (16.65%) such as the invasion of privacy ("we are very worried about photos, the videos they record of each other, how they use them because they use Instagram, Twitter, Facebook, they use all of them; it is very fashionable among girls of 13-14 to take topless selfies and pass them around the WhatsApp groups"). There is also dependency ("I think they are addicted; at the weekends they get up early and we have to tell them that they cannot use their cell phones until 10am"), interpersonal conflicts ("The serious misunderstandings that occur on WhatsApp, you are not seeing the person's face; they don't realize, they think they are funny, they have been working on the issue of bullying, 'don't you call me that!'), or even criminal actions on the Net ("At school, it began with some photos, then there were more problems, yes, it's bullying, no it isn't bullying").

In contrast, there were positive conceptions of the use of Internet by children in these two age groups, in particular, the potential offered by Internet for the child to develop (25.19%) in areas such as digital competence, self-management, social integration, autonomy, critical attitude, responsibility, mental development and spatial orientation. The parents also mentioned positive aspects such as access to information (22.4%), Internet's usefulness for learning and/or educating (15.22%), assistance in parental supervision (14.52%) and, to a lesser extent, its potential for communication and socialization (9.95%), leisure activities (9.9%) and a certain veneration for technology (2.82%). "This world has many positive things, access to information, knowing how to use it, talks about drugs; sometimes it surprises you, my child has seen the brain on Internet, it can raise critical capacity, searching for information; on the Internet you have all the options available from black to white, let the child decide".

The parents also acknowledged that Internet is a source of information for adults too, and is very useful for passing on knowledge to their children: "You get informed, and it is easier to sit down and talk about things with your kids, about sex, etc.; sometimes they ask 'Dad, what's this?'; in the morning, I go on the Internet to find out, and later I say, 'that thing you asked about yesterday... and I can answer them". The parents also emphasized the support of parents' groups who exchange information online.

### 3.2. Parental mediation strategies

The parents recognized that they use various strategies to mediate their children's use of Internet; 53.54% responded that they impose restrictions or control measures, while 46.46% said their interventions were of an instructive and supportive nature.

Restrictive parental strategies refer to daily practices of regulation and control of their children's use of Internet. Inappropriate behaviour on the Internet was punished (for example, by the withdrawal of cell phone), and they considered that it was important to be coherent, to reason and match the negative consequences to any online misbehaviour.

The type and quantity of restrictions the families established on Internet use varied when dealing with online activity during the week or at the weekend, with parents giving their children more freedom at weekends. The following control strategies were identified (Table 1): establishment and application of norms (57%), time-space organization (36%) and supervision (7%).

It is also important to note that some mothers were openly against none agreed-upon supervision because they see it as an attack on their privacy: "I have nothing to hide, but I'd get angry if they read my conversations; my conversations are mine, and I don't want my daughter or anyone else to read them".

The survey also revealed parental mediation in the form of support activities (Table 2) such as communication and teaching strategies (73.01%) and, to a lesser extent, of modeling (13.76%) and stimulation (13.2%).

The choice or combination of mediation strategies selected by the parents depends on the characteristics of their children, such as age and perceived maturity: "I have one older boy who I like to think that, because of his level of education, doesn't need to be controlled so much; he manages himself very well. As for my younger son, if I knew the method for getting him to manage himself, I would patent it; I can see big battles ahead, he is less aware of the risks".

The survey also showed that some parents tend to mediate reactively rather than proactively (forward planning), which they show both when trying to educate ("My son, for example, asks me questions as he goes along, and I answer them") as when imposing restrictions: "When I see her answering somebody using her real name I tell her, 'are you stupid? I've told you not to do that, so there! No more Internet for three months!' and I take it off her again".

**Table 1. Parental mediation strategies for controlling primary school pupils' use of Internet**

Establishing and enforcing rules	Delay purchase of cell phone with Internet access, allow child to use an adult's cell phone if the boy or girl does not have one of their own; be firm when the child insists on having a cell phone with WhatsApp and Internet access: "Rather than prohibit, we have taken it off them".
	Prohibit access when there is no adult present and block access to certain content: "They have to ask their mother or father before accessing content", "warn them if they see something online that is inappropriate".
	Remind them of, and emphasize constantly, the rules and prohibitions: "You are not going to have your cell phone until you are 12", "Do not upload photos!", "Don't give out information about where you are", "Do not switch on the computer without a parent present", "Do not search for things that you are too young to see".
	Negotiate and reach agreements, or establish rules related to homework: "They can use Internet to do homework", "They can use the Net after finishing homework", or "On days when they don't have homework".
Organizing time and space for Internet use	Restrict the time they spend on Internet, fix timetables and limit the space or screens they are allowed for accessing Internet: "They can only use it at home", "When they use it, we are all present, with the doors open", "No more than one screen switched on at a time", "All phones switched off or used only in a single space to avoid noise".
Supervision	Direct supervision: "I'm always more aware of the computer, of what they are up to, particularly on Internet; you control what they see and what they are watching, out of curiosity they can access material that is inappropriate".
	Agreed-upon and shared supervision: "I look at the things he sees, I tell him "Ok, show me", "I'll take a look" "Let's look at it together", I want him to know that I want to protect him, not because I want to spy on him; I also let him look at things on my computer so that he has the confidence to see things on mine, as I do on his".
	Non agreed-upon supervision: "I look at what she's looking at, I check her phone as I just don't trust her, I see if she answers people using her real name and age".
	Technical supervision: "The main computer in the house is in the living room and we keep a constant eye on it, we have software programs for parents and we selected the most appropriate one for our needs because the difference in age range is four years, and the youngest copies everything the older one does".

**Table 2. Support strategies in parental mediation of primary school pupils' use of Internet**

Communication	Establish bonds of trust and show interest in how they use Internet: "I trust my son because we have a lot of conversations, and this is what we have to cultivate. The trust between parents and children must never be broken; instead of emphasizing the negative, which is what we should never do, use positive communication by showing an interest and asking them about what they search for and see on Internet".
	Respond to their doubts and encourage them to reflect: "We must accompany them and make them question whether it is a good idea to download that photo".
	Discuss books about the risks of Internet use: "I want to talk about a particular resource, a book called 'Clara says', about a girl in the second year of secondary school who's a very good student and one day she joins a social network where they deceive her and she ends up committing suicide. The point is to read first then discuss with the children".
Teaching	Teach, explain, advise on Internet use and inculcate preventive attitudes: "I always tell him that anything that you don't want to tell another person face to face isn't to be written and sent", "Let me tell you something, anything you put online is there for the rest of your life; be very careful, don't trust anybody if they send you an invitation to join with them on WhatsApp. If you respond, always answer with lies".
Modeling	Instruct by example; learn from adults and older brothers and sisters: "They copy all that they see happening at home".
Stimulation / encouragement	Encourage self-disclosure: "They should have sufficient confidence in their parents to tell them if they have made a mistake or they have done something wrong", "Hey, is it alright if I watch this program?; you can take time out to explain to them: 'Maybe you don't realize that it's a bit...'"
	Incentives for self-regulation: "They start off joining twenty thousand groups, then they pause, and start to withdraw from groups, especially the ones they know are going to be troublesome; the WhatsApp tone will sound, and quite often they don't pay it any attention".

### 3.3. Perceived difficulties

When parents try to help their children use the Internet responsibly, they perceive the following difficulties:

1) Their own low level of knowledge about how to use the Internet, and that their children know more than them: "I don't know how to do it, my son knows much more about it than I do"; "In my house, the one who knows something about computers is me, I have learnt how to use it, on a very basic level, but I can get by".

2) Difficulties in controlling children's use of Internet: "Sometimes you just don't know what to do. I don't know what to do; take it off him. But it doesn't make any difference, he goes and takes the tablet and uses it on there".

3) Difficulties in negotiating rules on Internet use with children and up to what age they will abide by them: "There are rules for everything in this life. Another thing is whether you can negotiate them, or use your position of power, but at a certain age, they might no longer be willing to accept them".

4) Feeling insecure about how to teach them to live without being addicted to technology: "It's us parents who are in the wrong because we believe that 'they have been taught all they need to know'. We take many things for granted; it's us that need to be insistent in teaching them about the good things and showing them how to avoid the bad. At school, we have seen how children are now suddenly on their own; they get given a cell phone so they can be located, and we have forgotten that our parents had more control over us. The father can locate his son through the cell phone to know where he is, but if it gets stolen...".

5) Difficulties in controlling access to the Net in other spaces: "It's like putting up fences in a field (imposing rules); I am trying to get them to understand which content they can see and which not. I can more or less control my daughter of 11, but I have set rules for the older ones. I take the Wi-Fi off them, but they go outside and find another network to connect to".

6) Difficulties in planning instruction on how to use the Internet responsibly: "Answering the question of what you have done about planning. I think it's very difficult because you can have an idea, but then your son goes to a friend's house who has an older brother, and I hadn't planned to give them access to the Internet until they were 15, but they have now already been on the Internet. One thing is your idea of responsible use, and another is that they already have access to it".

7) Although there are new demands and strains on family-school relations, parents emphasize the importance of the role of the school in the development of pupils' digital competence: "We are very lucky with this school because they deal with this issue well. They give informal chats and our children know what is happening in the real world". One mother who took part, also a teacher at the school, recognized that the teachers are often overwhelmed by the problems that parents bring to them about how to control Internet access at these young ages:

“I am the tutor for a group of third-year primary school pupils. The parents come to me to solve the problem. It’s not me that has given them this device, but I must solve the problems that have arisen over the weekend about using it. Is it my responsibility to get involved in these questions, about something that the parents themselves bought for their children? Then they send me messages (via WhatsApp). Don’t they have rules? On Saturday at six in the afternoon and I have to solve their problems. What do I do?”.

#### 4. Discussion and conclusions

The analysis of parents’ beliefs regarding their sons’ and daughters’ use of Internet at primary school age shows that parents are more pessimistic than optimistic, which confirms that it is an issue that concerns them, as is evidenced in other works and cultural contexts (Duggan & al., 2015; Fletcher & Blair, 2014; Sorbring, 2014). The types of negative parental conceptions are, in this order of importance, the concern about the inappropriate use of the Net, the negative consequences of surfing the Internet (social, psychological, academic or physical), the uncertainty that Internet arouses in them as parents, and the risks and uncontrollable nature that they perceive in it. However, they also acknowledge that the use of the internet at this age can have its benefits: 1) It is an aid to children development in areas such as digital competence, self-management, social integration, autonomy, developing a critical attitude and responsibility; 2) It offers endless possibilities for accessing information, for learning, communication, and socialization; 3) It acts as a stimulus for parental supervision. The parents also recognized that the internet was a source of information and guidance for them too.

One contribution of this work is that it has gathered, expressed and publicized the main concerns and mediation practices that families use when trying to adapt themselves to their children’s use of Internet at these ages. Our study identifies various support and control strategies used by parents to instruct their children about the benefits and drawbacks of Internet use although the choice of strategy depends on characteristics such as age and perceived maturity, as indicated in previous works (Livingstone & Helsper, 2008; Sorbring, 2014). Parental mediation strategies for control of Internet use include the establishment of rules, organization of the time and space that limits its use, and supervision (direct, agreed-upon, nonagreed-upon and technical). Parental mediation strategies for support range from parental modeling, sibling modeling to teaching strategies for stimulation and communication within the family. These results coincide with those of other works that have found that the most common parental mediation strategies are social rather than just installing professional software on the computer to protect against unsuitable content (Garmendia & al., 2013; Kirwil, 2009; Livingstone & Helsper, 2008). Most of these strategies amount to day-to-day practices that families use to educate and control the behavior of their children in other areas, and which authors have related to the basic positive parental competences (Cheung, 2010; Padilla & al., 2015). This result confirms, as Cheung (2010) suggests, that control and supervision of children’s use of Internet form part of a general parenting style, and that the strategies applied to solve problems arising from Internet use do not differ substantially from those used to deal with other problematic behaviors. Therefore, the level of parental self-confidence in supervising and directing their children’s use of Internet would increase with the narrowing of the digital divide and the adoption of more effective parenting methods.

In general, parental mediation in the use of Internet tends to be more negative than positive, as evidenced by the amount of advice, rules and prohibitions regarding what children “must not” do when using the Internet rather than what they “should” do in order to make the most of using it, which could be related to parents’ low level of Internet knowledge and experience. Our study also found that parental mediation is more reactive than proactive, more a reaction than a previously planned response when instructing their children how to use the Internet correctly, as other works have mentioned (Fletcher & Blair, 2014). When facing what they perceive as unsuitable behaviour, it seems that parents tend to react by both instructing their children and restricting their use of Internet. Kirwil (2009) suggests that this reactive rather than proactive tendency is related to parenting mediation styles rooted in specific sociocultural contexts and that proactive intervention would be more recommendable when showing their children the benefits of Internet use and drawing attention to its dangers. When the mothers and fathers try to help their children to use the Internet, they perceive difficulties such as their own lack of experience and/or competence in using it. Although some works (Cheung, 2010) have found that even when parents do not know how to use the Internet, they can keep a close watch on their children when going online, other studies have related low digital competence to a lack of confidence in mediating and less awareness of the risks that can await children on Internet (Livingstone & Helsper, 2008). In addition, other authors have found that this adult Internet skill shortage relates to difficulties in providing support, structure and supervision of their children’s Internet use,

suggesting guided participation of children in the process of learning from the use of Internet is impoverished as the child is not accompanied or regulated by an adult's presence (Padilla & al., 2015). Fletcher and Blair (2014), basing on Mead's theory of societies that follow prefigurative cultural transmission patterns in which change happens so quickly that older generations find themselves disconnected from current social phenomena, conclude that expert knowledge is a fundamental element that minors take into account when evaluating the legitimacy of parental authority in a specific domain and that the progenitors could be experiencing a loss of authority in this area. Parents also perceive other difficulties when negotiating the rules on Internet use, feelings of insecurity about how to teach them to live without dependence on technology, on controlling access in spaces outside the home and planning for teaching them how to use the Internet responsibly. Finally, parents are concerned about the role of schools in the mediation of Internet use among primary school pupils. Other works highlight the lack of communication between schools and parents on questions related to the use of technology, and that families today demand with ever greater insistence advice on how to protect their children from dangerous content on the Internet (Fletcher & Blair, 2014; Livingstone & al., 2015).

The results on parents' beliefs, practices, and difficulties identified in this work point to the need to develop digital competence in parents, and to recognize the specific needs of training parents in three areas: 1) To promote the development of parents' digital skills; 2) To promote parental skills for mediating their children's use of Internet by reinforcing areas such as: organization of time and space, instruction on the risks and benefits, planning ahead to prevent unsuitable behaviour, strengthening parental authority, combining support (stimulation, communication, modelling) with control (rules and limits, supervision, negotiation), education in values of respect, equality, responsibility, critical thinking and autonomy, among others; 3) To promote collaboration between schools and families to increase pupils' digital competence.

Our study shows that there are implications for educational intervention directed at families and schools in our particular context. The first would be the need to design a protocol for joint action between schools and families on the use of Internet in primary education based on consensus between the entire educational community (head teachers, teachers, pupils, and families). The second is directly related to programs for the development of positive parenting which, according to these results, should explicitly integrate measures to improve parental digital competence. The third is that educational policy should recognize the concerns of families on the use of Internet by primary school pupils and provide new resources for training parents, combining various methodologies such as group work, online courses and MOOCs (massive open online courses). This research is limited by the fact that the results cannot be generalized.

Finally, for future lines of research, following the recommendations of the "European strategy for a more suitable Internet for children" (<https://goo.gl/Z7btvQ>), a range of courses and programs have been developed such as "Red.es" (<https://goo.gl/E4NMbk>), "Pantallas Amigas" (<https://goo.gl/rG3hK>), "Fundación Alia2" (<https://goo.gl/-RQc4>), "Fundación ANAR" (<https://goo.gl/CXC4y>) and "Padres 2.0 ONG" (<https://goo.gl/MWEYwx>). However, as several works point out (Kirwil, 2009; Livingstone & al., 2015), more research is needed on the evaluation and efficacy of these programs.

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### References

- Álvarez, M., Torres, A., Rodríguez, E., Padilla, S., & Rodrigo, M.J. (2013). Attitudes and parenting dimensions in parents' regulation of Internet use by primary and secondary school children. *Computers & Education*, 67, 69-78. <https://doi.org/10.1016/j.compedu.2013.03.005>
- Bringué, X., & Sádaba, T. (2009). *La generación interactiva en España: Niños y adolescentes frente a las pantallas*. Barcelona: Ariel y Fundación Telefónica. (<https://goo.gl/GES298>).
- Casas, F., Figuer, C. González, M., & Malo, S. (2007). Los medios audiovisuales entre los progenitores y los hijos e hijas. *Cultura y Educación*, 19(3), 311-330. <https://doi.org/10.1174/113564007782194499>
- Chaudron, S. (2015). *Young Children (0-8) and Digital Technology: A qualitative exploratory study across seven countries*. Luxembourg: Publications Office of the European Union. <https://doi.org/10.2788/00749>
- Cheung, Y. (2010). Cyber-Parenting: Internet benefits, risks and parenting issues. *Journal of Technology in Human Services*, 28(4), 252-273. <https://doi.org/10.1080/15228835.2011.562629>

- Connell, S.L., Lauricella, A.R., & Wartella, E. (2015). Parental co-use of media technology with their young children in the USA. *Journal of Children and Media*, 9(1), 5-21. <https://doi.org/10.1080/17482798.2015.997440>
- Duggan, M., Lenhart, A., Lampe, C., & Ellison, N.B. (2015). *Parents and Social Media*. Washington, DC: Pew Research Centre Report: Internet & Technology. (<https://goo.gl/AMXm7G>).
- Fletcher, A.C., & Blair, B.L. (2014). Maternal authority regarding early adolescents' social technology use. *Journal of Family Issues*, 35(1) 54-74. <https://doi.org/10.1177/0192513X12467753>
- Garmendia, M., Casado, M.A., Martínez, G., & Garitaonandia, C. (2013). Las madres y padres, los menores e Internet: Estrategias de mediación parental en España. *Doxa*, 17, 99-117. (<https://goo.gl/HbZyKZ>).
- Garmendia, M., Garitaonandia, C., Martínez, G., & Casado, M.A. (2011). *Riesgos y seguridad en Internet: Los menores españoles en el contexto europeo*. Universidad del País Vasco, Bilbao: EU-Kids Online. (<https://goo.gl/7SytA8>).
- Imeideh, F.M., & Shawareb, A.A. (2014). The association between Internet parenting styles and children's use of the Internet at home. *Journal of Research in Childhood Education*, 28(4), 411-425. <https://doi.org/10.1080/02568543.2014.944723>
- INTECO (Ed.) (2009). *Estudio sobre hábitos seguros en el uso de las TIC por niños y adolescentes y e-confianza de sus padres*. Observatorio de la seguridad de la información. (<https://goo.gl/1T8YCb>).
- Kirwil, L. (2009). Parental mediation of children's Internet use in different European countries. *Journal of Children and Media*, 3(4), 394-409. <https://doi.org/10.1080/17482790903233440>
- Livingstone, S., Haddon, L., Görzig, A., & Ólafsson, K. (2011). *EU-Kids Online II: Final Report*. LSE, London: EU Kids Online. (<https://goo.gl/hOKTxn>).
- Livingstone, S., & Helsper, E. (2008). Parental mediation and children's Internet use. *Journal of Broadcasting & Electronic Media*, 52(4), 581-599. <https://doi.org/10.1080/08838150802437396>
- Livingstone, S., Marsh, J., Plowman, L., Ottovordemgentschenfelde, S., & Fletcher-Watson, B. (2015). *Young children (0-8) and digital technology: A qualitative exploratory study - National Report - UK*. Joint Research Centre, European Commission, Luxembourg: LSE Research Online. (<https://goo.gl/ym2EJK>).
- Ofcom (2014). *Children and Parents: Media Use and Attitudes Report*. London: Office of Communications. (<https://goo.gl/7jx2BV>).
- Padilla, S., Rodríguez, E., Álvarez, M., Torres, A., Suárez, A., & Rodrigo, M.J. (2015). La influencia del escenario educativo familiar en el uso de Internet en los niños de primaria y secundaria. *Infancia y Aprendizaje*, 38(2), 402-434. <https://doi.org/10.1080/02103702.2015.1016749>
- Sonck, N., Nikken, P., & de Haan, J. (2013). Determinants of Internet mediation. A comparison of the reports by Dutch parents and children. *Journal of Children and Media*, 7(1), 93-113. <https://doi.org/10.1080/17482798.2012.739806>
- Sorbring, E. (2014). Parents' concerns about their teenage children's Internet use. *Journal of Family Issues*, 35(1), 75-96. <https://doi.org/10.1177/0192513X12467754>
- Sureda, J., Comas, R., & Morey, M. (2010). Menores y acceso a Internet en el hogar: Las normas familiares. *Comunicar*, 34(17), 135-143. <https://doi.org/10.3916/C34-2010-03-13>
- Takeuchi, L.M. (2011). *Families matter: Designing media for a digital age*. New York, NY: The Joan Ganz Cooney Center at Sesame Workshop. (<https://goo.gl/on63qU>).
- Turkle, S. (2011). *Alone together*. New York: Basic Books. (<https://goo.gl/E6baX>).
- Valcke, M., Bonte, S., De-Wever, B., & Rots, I. (2010). Internet parenting styles and the impact on Internet use of primary school children. *Computers & Education*, 55(2), 454-464. <https://doi.org/10.1016/j.compedu.2010.02.009>
- Valcke, M., De-Weber, B., Van-Keer, H., & Schellens, T. (2011). Long-term study on safe Internet use of young children. *Computers & Education*, 57(1), 1292-1305. <https://doi.org/10.1016/j.compedu.2011.01.010>

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# Perceptions and participation in community radio stations in Nariño-Colombia

## Percepciones y participación en emisoras de radio comunitaria en Nariño-Colombia

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### ABSTRACT

This work investigates the relationships between community radio and their audiences in the Department of Nariño, Colombia, considering Latin American and European experiences, and participation as a key element for social sustainability. The aim is to investigate whether the participation of citizens in the production, diffusion and radio management has been supported or not. Methodologically, we follow a mixed design that combined the results of two questionnaires: one, applied to 632 people from eleven municipalities; and the second, to eleven directors of communal stations. This was complemented with information provided by eleven groups composed of radio broadcasters, publishers and producers. One key finding within the audiences is that they recognize a radio station as a tool to enhance socio-cultural dynamics in the region. As to the directors of stations, it was found that they didn't encourage active participation with communities. It seems that the absence of active and critical participation on the part of the audiences is due to an organizational and radio production model that mirrors the commercial one. In conclusion, these factors have limited the construction of democratic relations between communal broadcasters and their audiences; and especially, reduced the possibilities for citizens to participate as valid interlocutors in a local communicational project.

### RESUMEN

El presente trabajo indaga sobre las relaciones entre las emisoras comunitarias y sus audiencias, en el Departamento de Nariño en Colombia, en el contexto de experiencias latinoamericanas y europeas, desde una perspectiva de participación, como elemento clave para la sostenibilidad social. Interesa observar cómo los ciudadanos se han propiciado o no de la producción, difusión y gestión radiofónica. Metodológicamente se trabajó desde un diseño mixto que trianguló los resultados de dos cuestionarios: uno, aplicado a una muestra de 632 personas de once municipios, y otro, a once directores de emisoras comunitarias. Esto se complementó con la información de once grupos focales integrados por locutores, editores y realizadores de radio. Uno de los hallazgos más relevantes, en las audiencias, fue el reconocer la emisora como un medio que puede potenciar dinámicas socioculturales en la región. Por su parte, en los directores, se encontró que han agenciado incipientes procesos de participación con las comunidades. Se infiere que existe una deficiente capacidad reflexiva y crítica en las audiencias, esto debido a que la mayoría de emisoras han adoptado el modelo organizativo y de producción de la radio comercial. Se concluye que estos factores han afectado la construcción de relaciones democráticas entre las audiencias y las emisoras comunitarias, y en especial, las posibilidades de participación de los ciudadanos como interlocutores válidos en un proyecto comunicativo.

### KEYWORDS | PALABRAS CLAVE

Community radio, communicative democracy, alternative media, participatory communication, active audiences, communicative citizenship, media access, social sustainability.

Radio comunitaria, democracia comunicativa, medios alternativos, comunicación participativa, audiencias activas, ciudadanía comunicativa, acceso a medios, sostenibilidad social.



## 1. Introduction

With technological advances, access to media information is increasingly simple, versatile and interactive. It is therefore becoming less relevant to talk about audiences from the media singularity and the polarity of actors in the informational model. In recent years, citizens, converted into audiences, participate in intensive exchanges and complex media relations through personalized virtual devices and other digital resources. A huge cluster of massive information is available that is getting closer to our intimate spaces every day, while the intimate has densified the massive scenarios of interactions. Media, mediations and mediators tend to confuse their places of enunciation, to understand each other and look for a new meaning. It is therefore necessary to investigate the relations between media and audiences. This is because of the doubts raised about themselves “Has it finished?... are the audience’s time finishing?” (Orozco, Navarro, & García, 2012: 68), or perhaps its existence is an artifice that is part of the logic of the market of information and publicity (Castells, 2011).

At the dawn of democratic contexts of information and communication, Cloutier (1973) concerned himself with the EMIREC, a term that was retaken and worked by Latin American communication researchers (Kaplún, 1997; Beltrán, 1981) to name a two-way dialogue function between emitters and receivers. Then the tension between producers and consumers was transformed, and more prominence was given to the audience. That is why they created qualifiers as active and passive audiences (Medina, Tamayo, & Rojas, 2010), Critical audiences (Camacho, 2005) and creative audiences (Talens, 2011); and in recent times, with the omnipresence of the Internet and social networks, the notion of prosumers is imposed. This was initially worked by Toffler and McLuhan (Sánchez & Contreras, 2012), where audiences are considered to be producers and consumers of media content at the same time.

At the heart of these tensions has been the ideal for democratizing the word, media and communications with the idea that it would encourage a more democratic society (Beltrán, 2016; López, 2005) from a Latin American perspective. Also some experiences in community media in Europe and Latin America (Martínez, Mayoke, & Tamarit, 2012) coincide in the appropriation of media and communicative processes achieved by experiences of communities, beyond legal recognition. In this sense, initiatives of the community, free and university media in Spain are highlighted (Collado, 2008). These are motivated by social movements, non-profit organizations, and from an inclusive radio approach (García, 2017), constituting what has been called the third Sector of communication in France and Spain (Ortiz, 2014), which also highlights experiences of university radios (Aguaded & Martín-Pena, 2014).

Parallel to these processes, a hegemony has been developing among the mercantile logic of the mass media and the global technological developments (Martín-Barbero, 2000) that have transformed this ideal in local versions of radio production where they articulate, indiscriminately, elements of the commercial media with their own cultural expressions and contents. Recent audience studies seem to be located in the conditions of a globalized, convergent, interconnected and trans mediated world (Lazo & Gabelas, 2016; Padilla & al., 2011), which shows how citizens are more active in their use of technologies. Bonilla believes that many of these studies have lost their political dimension when they stop seeing audiences as interlocutors and understand them as media receivers (2011). Thus, Padilla discusses the differences between being citizens and being audiences in a relationship charged by a mediated, political public sphere, and said author concludes that audiences tend to orient their media practices more towards communities of belonging and less towards political communities (2012). Other reviews distinguish between traditional audiences, social audiences and prosumers (Quintas & Gonzalez, 2014).

The emergence of community radio in Colombia has been linked to a set of political conditions such as the transformation and adoption of a new Political Constitution in the year 1991. Additional factors are related to the worsening of the armed social conflict, characterized as long-standing violence and dating from the beginning of the narco-trafficking phenomenon (Osse, 2015).

In the context of the second half of the end of the twentieth century, we see the appearance of the first regulations on community radio and those of public interest. From this moment on, the licenses for a first group of 564 community-based broadcasters are gestated. These were born with little institutional support and an incipient orientation to materialize their social function.

It is significant that the description of the community remains on a typology of radio stations legally recognised by the government of Colombia. Firstly, this is because it establishes a difference with private commercial radio stations in terms of their nature and mission objectives. Secondly, this was done because the opportunity to consolidate democratic processes of information and communication from the local is still latent.

The Ministry of Information and Communications Technologies of Colombia conceives community Sound Broadcasting as: a participatory and pluralistic public service, aimed at satisfying the needs of communication in the municipality or coverage area, facilitating the exercise of the right to information and the participation of its inhabitants through radio programs that promote social development, peaceful coexistence, democratic values, the construction of citizenship and the strengthening of cultural and social identities (Min TIC, 2017).

Thus this ministry does not carry out processes of accompaniment or follow-up; rather it only limits its functions to demand the fulfillment of technical and legal requirements. Meanwhile the Ministry of Culture focuses its efforts on the promotion of the production of contents through the Direction of Communications. And so, the idea of building democratic communication projects remains as a basis for the management of participatory practices from the plurality of their expressions and in articulation with those who lead media and local experiences, so that they can guarantee real possibilities of expression, dialogue, exchange and discussion of content, produced and disseminated, from the needs and aspirations of the citizens.

## 2. Material and methods

This article derives from the project “Challenges and limitation of sustainability that faced the community broadcasters affiliated to the Sindamanoy network of the Department of Nariño”, executed in agreement between the Mariana University and the UNAD during the years 2014 to 2016.

Based on the information collected, results are presented that respond to the objective of identifying the perceptions, preferences and needs of audience participation in community broadcasters. This objective is aimed at establishing how the role of audiences in social sustainability affects, as one of the key dimensions, the integral sustainability of these radio stations (Gumucio-Dagron, 2005). It is supposed that a community radio station is consolidated if the citizens, as audiences, validate, legitimize and contribute to the local communicative project.

The study was conceived from a mixed design (Creswell, 2013; Greene, 2006) based on a sample of 632 people surveyed and eleven directors of community stations affiliated to the Sindamanoy network of the Department of Nariño, Colombia. This was complemented by a simultaneous triangulation (Morse, 1991). This was the result of eleven focal groups, composed of radio broadcasters and radio producers, whose perceptions were consolidated by a SWOT matrix (Martínez & Ortega, 2016), in the first phase of the project.

The Department of Nariño is located in the south of Colombia on the border with Ecuador. Most of its population consists of small landholding farmings integrated by indigenous people, black communities and peasants. For the study, the community radio stations of the municipalities of Pupiales, Sandoná, Leiva, Mallama, Consacá, San Lorenzo, Gualmatán, Samaniego, Guaitarilla, Tuquerres and Funes were selected. The selection was made on the basis of reciprocity criteria, between researchers and investigated people, from a sense of trust, understanding, agreement and Sensibility (Sandín, 2000); A second criterion was the geographical location of the radio stations; and a third criterion took into account its active link to the network of broadcasters. The population of the audience was formed by men and women over 14 years-old who met the requirements of: 1) To have lived the last three years in one of the selected municipalities; 2) to have been a listener to one of the selected stations, thus we are within a group of active audiences of the radio stations (Medina, Tamayo, & Rojas, 2010). The sample design was organized by conglomerates equivalent to 0.3 of the population; and the selection was made by equal quotas of gender in each municipality. For the application of the survey, we opted for a simple random sampling system, depleting the two above-mentioned requirements. The surveys were applied between May 2014 and

The community on the radio is adopted as a label little linked with its democratic, participatory and inclusive sense; In recent years, some Latin American countries have renewed their policy frameworks and communication policies and unequal advances in legislation and the right to communication; however, in Colombia there is still an outstanding profound change in this direction.

February 2015 at the head of each municipality and its environs, through direct interview. The gathering of information was achieved with the support of a team of pollsters, previously trained, and that gave the information for tabulation and analysis. The pollsters adopted the strategy of a verbal informed consent prior to each interview.

The questionnaire consisted of 26 questions that were divided into two large groups: from question 1 to 8, demographically characterized to the population; from 9 onwards, priority was given to the category of social sustainability, namely the relationship between community radio stations and their audiences. To classify or group the type of questions, the following categories were used: access to the medium; media consumption frequencies; reception and programming preferences; knowledge about the community environment and participation in the Community radio station. The information was organized in a tabulation and analysis matrix. This was done with the support of the SPSS program in frequency tables. The descriptive analysis was made based on frequencies of response options that were consolidated in percentages compared to the inside of each question, which prioritized those that allowed one to respond to the objective of this work.

### 3. Analysis and results

Based on the proposed objective, the most relevant questions were prioritized for the categories of media perceptions, consumer preferences and citizen participation, which sought to identify a media trend in each of the responses in global percentages of all radio stations.

#### 3.1. Media perceptions

The perceptions of citizens on an informative medium, as audiences, allow us to identify possible misconceptions related to their organisational nature, the meaning of their contents and the forms of relationship with society. Figure 1 shows citizens' perception of the ideal nature of a community broadcaster. A 42.5% defines it as one that allows community participation, followed by a 35.3% that disseminates local interest information. Thirdly with 10.5% is the idea that has a varied programming. Two ratings below 5% consider that a community station is an information company or a media that makes social and institutional campaigns. Only 1.9% consider that it does not have an advertising pattern.

Another perception makes reference to the programming of the community radio medium. This emphasizes a trend of 53% that considers it varied, followed by a 26.7% that think it is interesting. The lowest values show that a 0.8% qualifies it unimportant. The perception of a varied and interesting programming gives community broadcasters an important recognition as a medium of local information, while only 0.9% think it is educational.

#### 3.2. Consumption preferences

The temporal frequency of citizens' media consumption, as shown in Figure 2, establishes that the radio continues to have a high daily preference (84.1%) competing very closely with television (82.4%), while the Internet occupies a third position (27%), and the written press (5.5%) is relegated. These results are related to two associated factors: 1) easy access and 2) listening as a historical-cultural practice. The internet is enjoying an emerging trend because of the

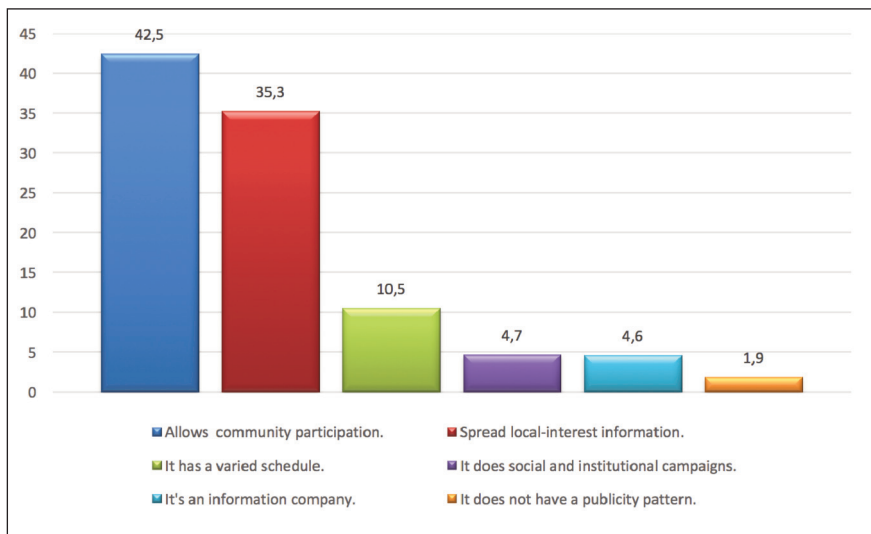


Figure 1. What defines a community station.

expansive market of mobile and Internet services, along with the promotion of government programs for digital modernization in educational institutions and local government. The written press is declining because of the few printed copies that are distributed in municipal offices and public institutions of the municipalities. This contributes

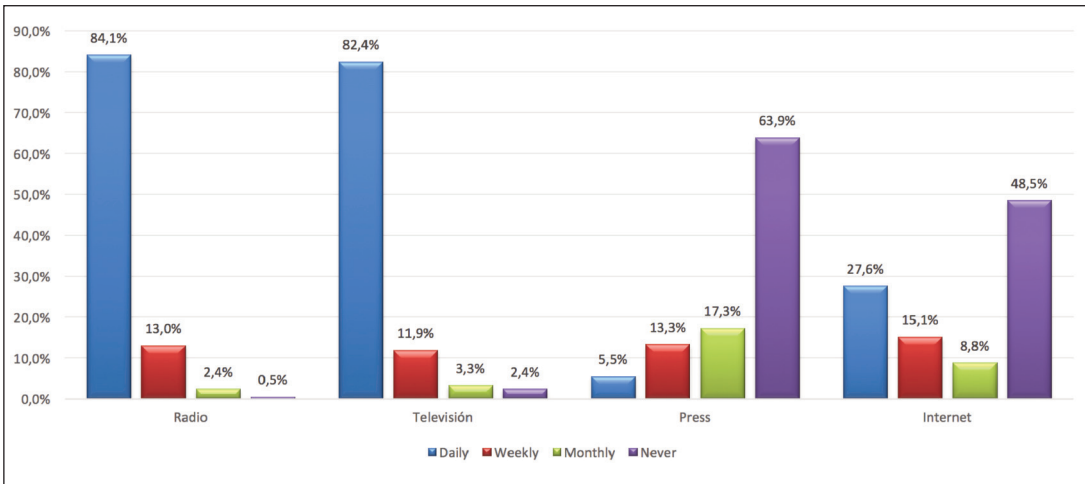


Figure 2. Frequency of media consumption.

to the fact that more and more people access the websites of the big newspapers, radio and television newscasts.

In addition, a second question indicates that 40.3% of the people listen to the community radio station between seven and ten in the morning. After this time, the average percentage of listeners is between 16.7% and 18.4%. Most community broadcasters only transmit up to six or seven in the afternoon.

This emission strip corresponds to the work activities of many people in the countryside whose day begins between six and seven in the morning and ends between five and six in the afternoon.

Reasons underlying the consumption of community radio stations: it was possible to demonstrate, in Figure 3, that the highest percentage of respondents (30.9%) do so by musical programming; followed by a (24%) for the diversity of programming; and a third group (16.4%) prefers it because it is part of the community and can participate in it. This trend was observed in the radio stations of Sandoná, Gualmatán, Guatarilla and San Lorenzo, where their directors have encouraged methods of bringing people closer to the broadcaster's programs. An intermediate group

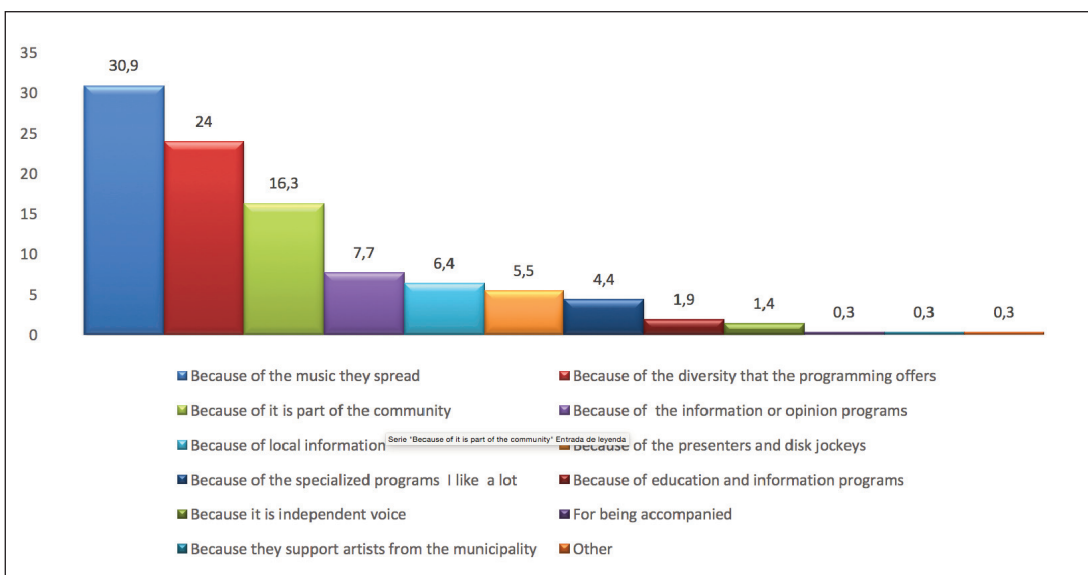


Figure 3. Reasons for listening to the community radio station.

of listeners appears (between 4.4% and 7.7%) whose motivation is located in programs of information, opinion and of specialized subjects, with the exception of another group that, although they are within this percentage range, their option is inclined towards the presenters and disk jockeys.

### 3.3. Citizen participation

Survey respondents were asked about the reasons why they had contacted the station. Figure 4 shows that 46.6% did it to request a song, then 9.4% to comment on a topic. This is significant in a group of community broadcasters where the production of informative and opinion programs is scarce. There are other reasons (8.9%) that are not clear according to the proposed response option. The options for: Making a suggestion, a complaint, a critique of the broadcaster, and participating in a debate, were below 4.1%. This demonstrates the precarious access that citizens have to the community media to express their critical opinions, grievances and disagreements freely.

In the survey applied to the directors, they consider that asking for a song constitutes an effective form of participation in the radio station. This is corroborated with (93%) of answers for Yes, against 7% No, in the option by telephone calls as a way to participate with the station.

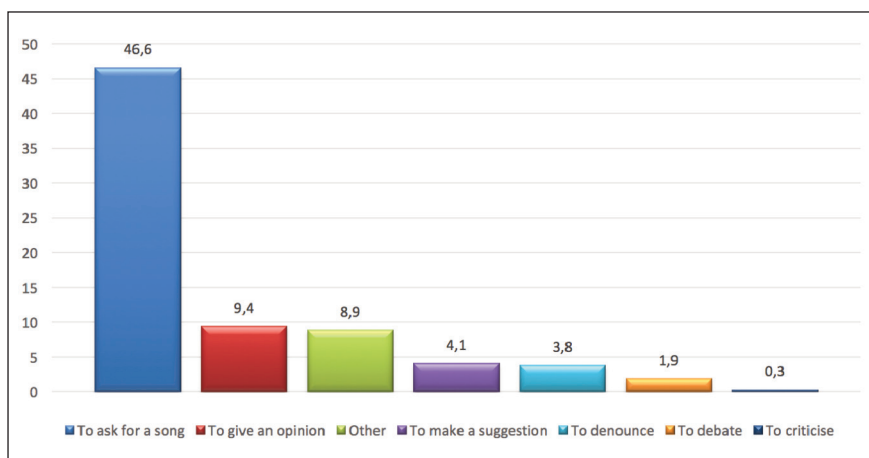


Figure 4. Reasons for contact with the station.

Something similar

happens with letters written with (80%) positive; and emails, chat, Facebook and Twitter with (73%). The lower percentages (60%) are in the participation in spaces of opinion and meetings with the work team of the station. This reflects a precarious opening for the organization of broadcasters to link citizens as active audiences in the production of programmes or in the management of other activities. It is clear that the directors and owners mark a clear distance with their audiences, similar to the traditional commercial radio model.

On the other hand, Figure 5 consolidates citizens' responses to their possible participation in activities convened or organized by community broadcasters in the last year. Here it was evidenced that 62.2% had not participated in any activity. A second group of replies (between 5.7% and 7.5%) are related to participation in: bazaars, fairs or community or municipal festivals; sports, religious activities, environmental campaigns, cleanliness and public areas.

In accordance with the consultation of the directors and the discussion groups, many of these activities have been promoted by local institutions and organizations with the support of the broadcaster in its dissemination and promotion. The lowest percentages (less than 2.8%) were obtained in: cultural activities, control and monitoring, campaigns in critical situations or catastrophes, radio workshops and protests or mobilizations. These results were because the broadcaster never promoted this type of activity, and only in a small proportion of them were carried out.

It was also asked if citizens would be interested in participating in a listeners' club. It was found that 45.3% would be willing, while 54.7% responded negatively. One last question was to establish whether citizens would be willing to support the community broadcaster in some way, and it was found that 36.1% opted for any of the above, 27.6% stated that it would do with voluntary work, 18.1% proposes programs, while only 1.1% would be willing to link directly to the radio station's team. It is inferred from this that citizens do not accept the radio station as their own, and therefore they do not express a clear desire to support it. However, the second and third highest percentage, show a favorable tendency to want to support the radio station explicitly and directly, engaging in its dynamics of production of content, which confirms the need and opportunity to strengthen actions for promoting citizen participation in the community radio stations.

#### 4. Discussion and conclusions

In 1994, for the first time the government of Colombia opened the possibility of legally recognizing the community broadcasters as an initiative that opened to a local radio conceived and produced from the communities. Twenty years after there are few studies in Colombia that realize what happened to these experiences, therefore, it is necessary to ask about their scope and limitations. This is important because of the relationship they have maintained with their audiences, and by how this relationship has allowed or not to set up a social sustainability.

At first glance, citizens associate community radio with two areas: participatory and dissemination of local information, and especially with the media visibility of microsocioal life in the village, the countryside or the neighborhood. The participatory appears more as an ideal than as a fact. To the directors the sense of these community radio stations is assumed as the dissemination of local information. This is an appreciation that the discussion groups also share. Everyone agrees with the idea that the community radio station is the place where fragments of local history are shared with people and institutions are known to each other. The community radio station is considered to be a close and a very emotional medium.

Although for the citizens there is a collective feeling to reassess the local as a cultural and emotive place to find themselves, this does not correspond with the organizational dynamics and programming of the radio stations. The feeling of valuation by the local is closer to identifying with aesthetic-cultural and territorial-institutional symbols than with political and social situations arisen from the needs and problems felt by the citizens. Perceptions of what defines a community radio station show a paradox between local, as the place that includes them socially and culturally; and the radio station, as a space that excludes community participation, but at the same time it is useful to the facts of community life.

In different ways, each one of the community radio stations has configured a sense of territorial belonging expressed in the valuation of the medium as relatively own and close to its realities. Beyond being considered a business organization it conceives as a space that disseminates, sporadically, some narratives of local life. Paradoxically, this perception of the radio station as an information company does not manage to be general in the citizens, while for directors and owners, the issue of economic sustainability and consolidate it as a company, is one of its main concerns. The production teams of community broadcasters, four to seven people, are linked to low salaries or voluntarily. The historical cause of the privatization of many of these community radio stations in Colombia is largely due to the way the Ministry of Communications allocated licensing concessions. The majority were given to individuals or families who, as part of a social organization, assumed the representativeness of the communities of a municipality and appropriated the radio station as a private medium.

Citizens prefer to listen to community broadcasters for their musical programming and some informative programs from early hours of the day. Nevertheless, in municipalities in the south and the center of the department

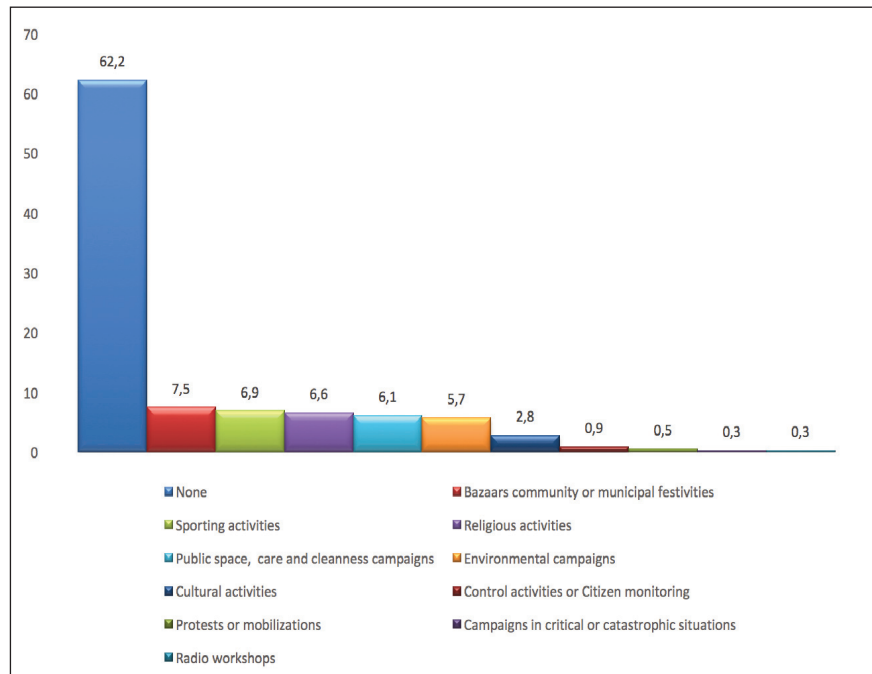


Figure 5. Activities promoted by the station.

have the option of listening to other radio stations of regional coverage. The musical preference, as a radio reception practice, is based on the way in which the listeners have traditionally been constituted in Colombia. The notion of the tradition of radio-listening comes very deliberately as a variable of great influence in the historical-cultural formation of the Colombian citizens, especially those who inhabit the rural sectors. Many learned to listen to the radio of the commercial models. It has built a collective imagination that considers as a "good radio station" to the one that offers a commercial music programming that the listeners like. Thus the musical genre has become the guideline for greater consumption of the commercial radio stations, which has been imitated by the community members.

This referential effect or mirror action of the commercial model arose from the granting of the licenses of the Community stations to people and organizations. Their knowledge in production of radio programs was based on the commercial radio stations, since the scarce experiences of popular and alternative media in Latin America managed to be significant but invisible; Many were reviewed by academics and social organizations, but in essence they do not transcended their political sense to the community broadcasters in Colombia. This is explained by the global and neoliberal sociopolitical dynamics that were undermining critical thinking and liberal speeches that inspired social movements at the end of the cold war and throughout the late twentieth century.

Of the first radio speakers, journalists and radio producers in Colombia, including the community radio stations started as empirical, some had secondary school education. Some were technicians or teachers, and many of them learned the formats and ways of making the commercial radio. Some risked producing information, live broadcasts of sporting and cultural events, and a few explored the magazine format. The radio producers of the community radio were adjusting their formats, schedules and contents from the early morning to late afternoon, in such a way that they avoided the strong and expansive competition with the national channels of the commercial television, for many years they were positioned from noon the night. This strategy has enabled community broadcasters to achieve partial social sustainability with their audiences through a musical, informative, and little local-opinion program, implying that citizens choose to combine their preferences media consumption between local radio and national television.

The results make it possible to observe that the citizens participate passively in the station, which agrees with Ramírez (2014:122) in Chile, and García & Ávila (2009) in Ecuador, although there are stations in Nariño whose directors make efforts to promote participatory processes with their audience (Martínez & Ortega, 2017: 19). The audiences of the community stations in Nariño have gradually been assuming the dynamics of social audiences due to the gradual use of social networks to interact with the radio station. Therefore, efforts are required to foster spaces and dynamics whereby listeners are assumed as prosumers of community radio.

The community radio stations in Nariño do not achieve a local leadership that summons other social or cultural activities other than the ones of its programming. That is because of the absence of a political-social communication project that allows the articulation of efforts between those who run the radio stations and the organized communities. The incipient participation of the communities in these radio stations is due to four factors: first of all, to the connotation of private means as their directors and owners have conceived; Secondly, to the adoption of the commercial model in its organization and programming; Thirdly, by the incipient formation of citizens as radio producers and critical audiences; and fourthly, the lack of accompaniment mechanisms, monitoring and control over the mission of community radio stations.

The above questioned the appropriation of citizens with their community radio station, particularly when they were asked on how they would be willing to support or to link with it. Although these percentages are low, they become an opening opportunity to articulate and advance in the missionary spirit of community radio. This indicates that there is a lot of potential citizens who would be willing to participate and strengthen their programming from the sociocultural realities. This environment of estrangement between those who run the community stations in Nariño and their audiences has generated a relationship in which the citizens are excluded and the right to free expression is denied.

It is concluded that the community radio stations investigated have potential audiences (Medina, Tamayo, & Rojas, 2010) that have not been sufficiently used as interlocutors, producers and collaborators within a communicative project. This is due to the little community sense which the information practices and the social relations between the environment and the citizens have been assumed. On the other hand, there is also the lack of interest of the Colombian Government, in particular the Ministry of Information and Communications technologies, for the issues of social participation and democratization of the community media and citizens. This situation is similar to



what happened in Argentina with the community broadcasters within the policies of communication and culture (Linares & al., 2017), as evidenced in the case of this study.

A second conclusion reveals how none of the community broadcasters has a community communicative project built collectively and from the needs of its citizens. This is owed to the improvisation of activities and short-term planning. A factor of great incidence, observed in the responses of directors and discussion groups, this organizational vertical scheme where decisions are concentrated in the head of a director (as the owner of the medium) and in other cases on the board of Directors, which coincides with the Mora study (2011).

A third conclusion of this work shows that, from the organizations and managers of the community broadcasters, a participation of citizens in their programming is not promoted, nor do they lead other social or community activities, which it generates a double relationship: on one side of proximity as listeners in front of its musical programming; and on the other hand distance in terms of actions of participation and social appropriation of the medium, conclusion that agrees with Rodríguez in relation to the lack of participation in the informative discourse of the community radio (2012). This confirms the fact that community broadcasters continue to orient themselves with a sense of private organization. This coincides with Padilla (2012), about the incipient link between being audiences and being citizens. Thus, the community on the radio is adopted as a label (Talens, 2011) little linked with its democratic, participatory and inclusive sense; In recent years, some Latin American countries have renewed their policy frameworks and communication policies (Sosa, 2016) and unequal advances in legislation and the right to communication (Gómez & Agerre, 2009); however, in Colombia there is still an outstanding profound change in this direction.

It is clear that the political commitment between the community and the citizen remains a pending issue in the radio stations investigated, which a structure of organization and production taken of the commercial reference is adopted, with some attempts to incorporate contents of the culture and events of local life. Communicative citizenship is not a practice of political significance through these community media (Rodríguez, 2009:18), nor does it recognize its inhabitants as interlocutors in the relation medium – audiences, which coincides with the study of Álvarez (2014) on the community radio stations in Valle de Aburra in the department of Antioquia in Colombia. The community broadcasters in this region of Colombia go through a moment of relative stagnation and redefinition of their political and social horizon. Recently they have advanced in the consolidation of the Sindamanoy network community radio stations of Nariño where they share democratizing, participatory and collective-building principles that try to materialize by articulating actions with the Communication System for Peace (SIPAZ) in Colombia, and AMARC at the global level.

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### References




- Aguaded, I., & Martín-Pena, D. (2014). Educomunicación y radios universitarias: Panorama internacional y perspectivas futuras. *Chasqui*, 124, 65-72. (<https://goo.gl/U6TQEp>).
- Álvarez-Moreno, M.A. (2014). El desafío de las radios comunitarias. *Anagramas*, 6(12), 59-75. (<https://goo.gl/1JBQyr>).
- Beltrán, L.R. (2006). La comunicación para el desarrollo en Latinoamérica: Un recuento de medio siglo. *Anagramas*, 4(8), 53-76. (<https://goo.gl/VmtLK9>).
- Bonilla-Vélez, J.I. (2011). Re-visitando los estudios de recepción/ audiencias en Colombia. *Comunicación y Sociedad*, 16, 75-103. (<https://goo.gl/QttSJ5>).
- Camacho, C.A. (2005). Democratización de la sociedad: Entre el derecho a la información y el ejercicio de la ciudadanía comunicativa. *Punto Cero*, 10(10), 28-36. (<https://goo.gl/42WvXt>).
- Castell, M. (2011). *Comunicación y poder*. Madrid: Alianza.
- Cloudier, J.C. (1973). *The communication audio-scripto-visuelle. Communication et Langages*, 19. Montreal: Presses Universitaires.
- Collado-Campaña, F. (2008). La influencia de las radios y las televisiones comunitarias en la construcción de la ciudadanía. *Ámbitos*, 17, 209-224. (<https://goo.gl/3Qbxzx>).
- Creswell, J.W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches*. Thousand Oaks: Sage.
- García, J.G. (2017). Transformaciones y aprendizajes de las radios comunitarias en España: Hacia un modelo de radio inclusiva. *Disertaciones*, 10(1), 30-41. <https://doi.org/10.12804/revistas.urosario.edu.co/disertaciones/a.4535>
- García, N., & Ávila, C. (2016). Nuevos escenarios para la comunicación comunitaria: Oportunidades y amenazas a medios de comunicación y organizaciones de la sociedad civil a partir de la aplicación del nuevo marco regulatorio ecuatoriano. *Palabra Clave*, 19(1), 271-303. <https://doi.org/10.5294/pacla.2016.19.1.11>

- Gómez, G., & Aguerre, C. (2009). *Las mordazas invisibles. Nuevas y viejas barreras a la diversidad en la radiodifusión*. Buenos Aires: AMARC-ALC.
- Greene, J.C. (2006). Toward a methodology of mixed methods social inquiry. *Research in the Schools, 13*(1), 93-98. (<https://goo.gl/zTg2ST>).
- Gumucio-Dagron, A. (2005). Arte de equilibristas: la sostenibilidad de los medios de comunicación comunitarios. *Punto Cero, 10*(10), 6-19. (<https://goo.gl/auqbYm>).
- Kaplún, M. (2002). *Una pedagogía de la comunicación (el comunicador popular)*. La Habana: Caminos. (<https://goo.gl/vw0G1b>).
- Lazo, C.M., & Gabelas, J.A. (2016). *Comunicación digital: un modelo basado en el factor relacional*. Barcelona: UOC.
- Linares, A., Segura, M.S., Hidalgo, A.L., Kejval, L., Longo, V., Traversaro, N., & Vinelli, N. (2017). Brechas: La desigualdad en las políticas de fomento de medios comunitarios, otros medios e industrias culturales. *Revista Latinoamericana de Ciencias de la Comunicación, 13*(25). (<https://goo.gl/xwGPmG>).
- López-Vigil, J.I., & Barrientos, I. (2000). *Manual urgente para radialistas apasionadas y apasionados*. Quito: Artes Gráficas Silva.
- Martín-Barbero, J. (2000). Las transformaciones del mapa cultural: una visión desde América Latina. *Revista Latina de Comunicación Social, 26*. (<https://goo.gl/AgCEP2>).
- Martínez-Hermida M., Mayugo-Majó, C., & Tamarit-Rodríguez, A. (2012). *Comunidad y comunicación: prácticas comunicativas y medios comunitarios en Europa y América Latina*. XV Encuentro de Latinoamericanistas Españoles (pp. 499-513). Madrid: Trama. (<https://goo.gl/WVYMQb>).
- Martínez-Roa, O.G., & Ortega, E.G. (2016). *Desafíos de sostenibilidad de la radio comunitaria en Nariño en Colombia*. *Nexus Comunicación, 20*, 6-21. <https://doi.org/10.25100/nc.v0i20.1831>
- Medina-Valencia, A., Tamayo-Gómez C., & Rojas, I. (2010). *Analizar audiencias, construir nuestros sueños. Manual metodológico para la medición y análisis local de las audiencias de las emisoras comunitarias en Colombia*. Bogotá: MinTIC.
- Ministerio de TIC (Ed.) (2017). Sector de radiodifusión Sonora en Colombia. (<https://goo.gl/F98RP>).
- Mora-Vizcaya, C.E. (2011). Formas de participación en las radios comunitarias habilitadas del Táchira: Estudio de campo. *Disertaciones, 4*(1), 6. (<https://goo.gl/d5x7US>).
- Morse, J. (1991). Approaches to qualitative-quantitative methodological triangulation. *Nursing Research, 40*, 120-123. (<https://goo.gl/2oxHjX>).
- Orozco, G., Navarro, E., & García, A. (2012). Educational challenges in times of mass self-communication: A dialogue among audience. [Desafíos educativos en tiempos de auto-comunicación masiva: La interlocución de las audiencias]. *Comunicar, 38*, 67-74. <https://doi.org/10.3916/C38-2012-02-07>
- Ortiz-Sobrino, M.A. (2014). La radio como medio para la comunicación alternativa y la participación del Tercer Sector en España y Francia. *Comunicación y Hombre, 25-36*. (<https://goo.gl/udswvi>).
- Osses Rivera, S.L. (2015). Cincuenta años de radio comunitaria en Colombia. Análisis socio-histórico (1945-1995). *Revista General José María Córdova, 13*(16), 263-28. (<https://goo.gl/KVy22o>).
- Padilla, M.R., Repoll, J.L., González D., Moreno, G., García, H., Franco, D., & Orozco G. (2011). México: *La investigación de la recepción y sus audiencias. Hallazgos recientes y perspectivas. Análisis de recepción en América Latina: un recuento histórico con perspectivas a futuro*. Quito: CIESPAL.
- Padilla, M.R. (2012). Dificultades en el vínculo entre el ser ciudadanos y audiencias. *Derecho a Comunicar, 5*, 29-45. (<https://goo.gl/MSYsbN>).
- Quintas, N., & González, A. (2014). Active audiences: Social audience participation in television. [Audiencias activas: Participación de la audiencia social en la televisión]. *Comunicar, 43*, 83-90. <https://doi.org/10.3916/C43-2014-08>
- Ramírez, J.D. (2014). En Chile ¿radio comunitaria o ciudadana? *Luciernaga, 6*(12), 118-126. (<https://goo.gl/YmgmsF>).
- Rodríguez, C. (2009). De medios alternativos a medios ciudadanos: trayectoria teórica de un término. *Folios, 21-22*, 13-25. (<http://goo.gl/ADUHs>).
- Rodríguez, C. (2012). *Lo comunitario en la radio comunitaria: Análisis crítico del discurso en el lenguaje informativo utilizado por emisoras comunitarias (Tesis de Maestría)*. Bogotá: IECO, Universidad Nacional de Colombia. (<https://goo.gl/9dVGDJ>).
- Sánchez-Carrero, J., & Contreras-Pulido, P. (2012). De cara al prosumidor. Producción y consumo empoderando a la ciudadanía 3.0. *Icono 14, 10*(3), 62- 84. <https://doi.org/10.7195/i14.v10i3.210>
- Sandín-Esteban, M.P. (2000). Criterios de validez en la investigación cualitativa: De la objetividad a la solidaridad. *Revista de Investigación Educativa, 18*(1), 223-242. (<https://goo.gl/AD8rKp>).
- Sosa-Plata, G. (2016). Concentración de medios de comunicación, poder y nuevas legislaciones en América Latina. *El Cotidiano, 17-30*. (<https://goo.gl/uk3moU>).
- Talens, C.I. (2011). ¿Ni indígena ni comunitaria? La radio indígena en tiempos neoindigenistas. *Comunicación y Sociedad, 15*, 123-142. (<https://goo.gl/DvrMjk>).



# Strategies for the communication and collaborative online work by university students

Estrategias para la comunicación y el trabajo colaborativo en red de los estudiantes universitarios

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## ABSTRACT

The impact that Information and Communications Technologies have in the way today's young people communicate and interact is unquestionable. This impact also affects the educational field, which is required to respond to the needs of twenty first century students by training them in acquiring new skills and strategies to deal with a changing and uncertain future. In this study, which involved 2,054 university students from all Spanish Universities, it delved into the knowledge of networking strategies and tools used by these students for the effective development of communication processes and the implementation of strategies for collaboration and communication. It has been developed a non-experimental quantitative methodology and the technique used for collecting information was a questionnaire. The results show that all of them use the Internet to communicate and they have a great use of basic tools to collaborate and interact, but they prefer social networks for being in contact with their peers and establishing relationships. It has been found that students do not have the idea of the Internet as a place to learn. This fact implies new challenges to be solved by Universities, to optimize the possibilities of the networks and institutional platforms as an environment to learn collaboratively.

## RESUMEN

El impacto que las tecnologías de la comunicación tienen en la forma en la que los más jóvenes de hoy en día se comunican y relacionan es incuestionable. Dicho impacto afecta también al campo educativo, al que se le exige que dé respuesta a las necesidades de los estudiantes del siglo XXI, formándoles en la adquisición de habilidades y estrategias para afrontar un futuro cambiante y lleno de incertidumbre. En este estudio, en el que han participado 2.054 estudiantes universitarios de todas las universidades españolas, se profundiza en el conocimiento de las estrategias y herramientas en red empleadas por estos estudiantes para el desarrollo efectivo de los procesos comunicativos y colaborativos. Se ha realizado un diseño de investigación no experimental, de tipo exploratorio basado en el uso del cuestionario como instrumento de recogida de información. Los resultados muestran un mayor uso por parte del alumnado de herramientas básicas de Internet para el trabajo colaborativo mientras que para estar en contacto con sus compañeros y establecer relaciones prefieren las redes sociales. Se ha encontrado que no existe por parte de los estudiantes una concepción de la Red como espacio de aprendizaje, por lo que se plantean nuevos retos a resolver por parte de la institución universitaria de cara a que sus estudiantes optimicen las posibilidades de la Red como lugar en el que aprender colaborativamente.

## KEYWORDS | PALABRAS CLAVE

Digital communication, collaboration, interaction, learning, Internet, students, university, PLE.  
Comunicación digital, colaboración, interacción, aprendizaje, Internet, estudiantes, universidad, PLE.



## 1. Introduction

In recent years the Internet has become, above all, a huge provider of tools that have been developed to enable user participation and communication among those users. Tim O'Reilly defined Web 2.0 as the new paradigm regarding how we use the Internet, in which tools are platforms for users to use and which foster communication (O'Reilly, 2005). When O'Reilly penned this reflection in 2005, the main tools were blogs and wikis, which had transformed how information was published and shared. While this in itself was considered a communication revolution, the social networks boom in 2009-2010 (Observatorio de Redes Sociales, 2011) has further enhanced the idea of the web as a platform in which communication is the fundamental component. The Internet, the network of networks, has always provided communication among its users through tools like email, forums, and chat rooms. These applications have served to broaden and diversify the channels of communication to the extent that today's web, based on communication and mobile technologies, is considered to be Web 3.0 (Kolikant, 2010), which goes beyond the definition of a semantic web.

Whatever definition we choose to adopt, what we believe to be important is that the way we have been communicating and relating to each other over the web in recent years is what has changed our online behavior. The new channels and ways of communication have led to changes in various environments, which means that there are implications for education which need to be valued. If today's environment has changed in this way, the obvious question is what can we, in the world of education, do to enable students to learn to develop the basic skills required for online communication. This is important not only at the professional level, encouraging young people to cope well in a changing environment but also at the personal level since online communication also affects how young people build their own identities (Bernet, 2010).

An additional consideration is that today's university students are known as "digital natives" (Prensky, 2001), because they were born into a technology environment and, therefore, have developed specific skills and attitudes which condition their learning. The "digital native" concept has had a knock-on effect on the world of education, although it has been surpassed in subsequent terms, like "digital resident" coined by White and Le Cornu (2011). Indeed, terms abound as Gisbert and Esteve (2011) show, e.g., "digital learners", "Generation Y" (Lancaster & Stillman, 2002; Jorgensen, 2003; McCrindle, 2006) "Generation C" (Duncan-Howell & Lee, 2007) or "Google Generation" (Rowlands & Nicholas, 2008) all of which underlines how important it is to understand that today's university students represent a generation that was born into a world that had already been transformed by technology where the rules of the game are different, especially when working with information. Hence, the normal development, values, and history of this generation are technology driven. Students do not learn better with ICT because they are digital natives, although they do find it easier to move in these digital environments. Nevertheless, we do need to work with students on basic information management and the development of communication skills.

Prensky (2009) indicates that his description in 2001 is interesting, but that the revolution of webs means that we should really be talking about "digital wisdom" if we are to understand that human beings have to draw on their natural capacities with existing technologies because they increase and enhance the opportunities for communication and collaboration.

Whether or not we call them digital natives, what we have is a generation that uses technologies differently. Various studies have thrown up data of interest:

- 26.25 million Spaniards connect to the Internet regularly; 1.45 million more than in 2013. Of these, 20.6 million connect up every day, i.e., 78% are constantly connected (Fundación Telefónica, 2014).
- Children aged 10 to 17 years mainly use instant messaging (Whatsapp) to communicate, while they use the Internet in general for school tasks and to search for information (Spanish Home Office, 2014).
- Youngsters who frequently use social networks are those who also use other types of tools like blogs and wikis (García-Jiménez, López de Ayala, & Catalina-García, 2013).
- 53.2% of teenagers between 14 and 16 mention new contacts with whom they are in touch mainly online, so this technology is acting as a mechanism for socialization and support of these friendships (Sánchez-Vera, Prendes, & Serrano, 2011).
- Those who make the most use of social networks are also those who are most frequently active online when seeking and sharing contents (García-Jiménez & al., 2013).
- University students have a positive attitude toward social networks (especially Facebook) for educational purposes and for keeping in contact with colleagues (Espuny, González, Lleixá, & Gisbert, 2011).

As we saw earlier, the importance of ICTs in how young people communicate today is beyond question. So

the time is ripe to ask whether the way young people use the web affects their learning, which leads us to the idea of the PLE (Personal Learning Environment). PLE is an issue that has been catching researchers' attention (Chaves, Trujillo & López, 2015). The concept joins two foci of research: student centered learning processes, and how technologies affect or may affect them.

While some authors take a more technological approach to PLEs (Mödrischer & al., 2011), others, like Castañeda and Adell (2013), adopt a more pedagogical stance, in which the PLE is understood not only as a set of tools but also as information processing the connections established with other people and the creation of knowledge itself. Thus, a PLE would comprise three fundamental parts (Castañeda & Adell, 2011):

- Reading tools and strategies through which information is accessed and managed.
- Reflection tools and strate-

gies related to the places where I write and participate.

- Relation tools and strategies related to the environments in which I am in contact with others.

It is the last category that interests us in this paper. Within it, we can include the concept of Personal Learning Network (PLN) to refer to the tools, mechanisms, and activities that we set in motion when communicating with others, when we share resources and when we exchange information (Castañeda & Adell, 2013; Marín & al., 2014). The great advantages of the web are the communication possibilities that it affords. This is important because knowing what tools and strategies university students use means we can devise the strategies to improve their skills as well as provide better online relations concerning their future professional development. PLE theory states that the personal environment that we all have can help us to self-regulate our learning, from setting our goals to a final self-evaluation (Chaves & al., 2015).

This view of the PLE is linked to the idea of a society in constant change that demands updates as well as ongoing, lifelong training to adapt to those changes (Coll & Engel, 2014).

The research we present here stems from the project known as CAPPLE (Competences for Lifelong Learning based on the use of PLEs. Analysis of future professionals and proposals for improvement). The project is funded by the Spanish Ministry for Economy and Competitiveness, and its main aim is to study and learn more about the PLEs of final year students in all subjects at Spanish universities. The starting point is the need to train future professionals in the use of telematic tools and learning strategies so that they are in a better position to create and take advantage of the best opportunities throughout their professional lives (Prendes, 2013).

## 2. Materials and methods

### 2.1. Aims

The aim of this paper is to obtain a deeper knowledge of the online strategies and tools that students use, especially in the area of communication. We seek to answer the question: What type of online strategies and tools do university seniors (final year) use to communicate and collaborate with others? Hence, the objectives to meet are:

Students do not learn better with ICT because they are digital natives, although they do find it easier to move in these digital environments. Nevertheless, we do need to work with students on basic information management and the development of communication skills. Prensky (2009) indicates that his description in 2001 is interesting, but that the revolution of webs means that we should really be talking about “digital wisdom” if we are to understand that human beings have to draw on their natural capacities with existing technologies because they increase and enhance the opportunities for communication and collaboration.

- To ascertain and describe how final year university students use telematic tools for online communication and collaboration.
- To analyze students' online preferences and tools when carrying out group projects along with the importance they give to various aspects proper to learning and online collaboration.
- To observe the data and results obtained concerning the sex of the participants and the branch of knowledge to which they belong.

## 2.2. Research design

The research is empirical and seeks to gather information of a descriptive type with no between group comparisons and no manipulation of variables. It is therefore non-experimental, of an exploratory nature, and uses a questionnaire to collect the data (Ato & al., 2013, Pardo, Ruiz, & San Martín, 2015).

The research was carried out in five work phases between 2013-2017 (Prendes, Castañeda, Ovelar, & Carreras, 2014): a theoretical review of PLEs and earlier studies; design and validation of the tool; data collection; data analysis; and, description of the participating students' PLEs.

## 2.3. Sample

The study was comprised of 2054 final year degree students at Spanish universities. Females accounted for 69.67% and males for 30.33%. Since it would have been impossible to access the whole population because volunteer students were targeted, the sampling was non-probabilistic. Although the sample is broad, it is not representative, and no inferences can be made for the population as a whole. The graph below shows the distribution of the participants by area of knowledge.

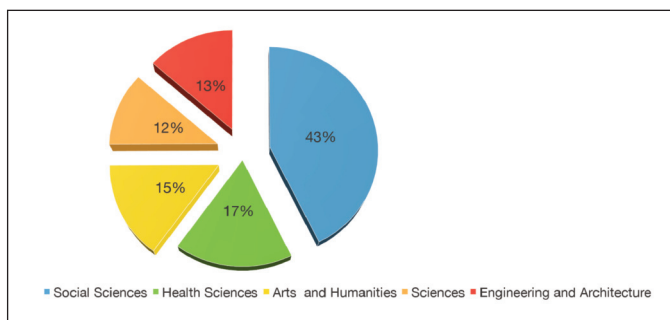


Figure 1. Distribution of participants by area of knowledge.

## 2.4. The tool

A questionnaire that was used, was built on theoretical models of PLEs (Castañeda & Adell, 2011, 2013), self-regulated learning (Anderson, 2002; Martín, García, Torbay, & Rodríguez, 2007; Midgley & al., 2000; Pintrich, Smith, García, & McKeachie, 1991) and communication and ICT competences (Prendes & Gutiérrez, 2013).

The questionnaire was subjected to a three-step validation procedure: expert judgment cognitive interviews and pilot study. Finally, psychometric tests were applied to test for the reliability of the scale, returning a Cronbach alpha of reliability of 0.944.

The questionnaire was comprised of 48 items. It was administered through email. The final version and the complete validation process can be found in Prendes and others (2016). In the following link, we will find the full questionnaire: <https://goo.gl/ta93A8>.

## 3. Analysis and results

### 3.1. Data analysis

Consistent with the research approach, a descriptive analysis was made; and the results of which, regarding the communication and strategy tools and collaborative work used by the students interviewed, are given below (as percentages). Due to the very nature of the variables (they are all categorical), and with the idea of going a step further in the research, associations were made using contingency tables and Pearson's X<sup>2</sup> test for the independence of the chi-squared statistic and the contingency coefficient C.

### 3.2. Results

#### 3.2.1. Online communication and use of tools

None of the students interviewed stated that they did not communicate online. The most popular tool for

communication is email (79.12%), followed by social network tools (75.52%). It was determined that the use of social networks is associated with students' interest in learning  $\chi^2(9, 2047)=796.934a$ ,  $p<0.001$ ,  $c=0.529$  and with their preference to publish new information they generate on social networks  $\chi^2(9, 2054)=387.805a$ ,  $p<0.001$ ,  $c=0.399$ .

Regarding areas of knowledge, students of Health Sciences use email the most (80.95%), while those in Engineering and Architecture use it least (76.47%). Regarding sexes, females (81.01%) state that they use basic tools for communication, which is more than males (75.19%).

If we address the use of social media tools about the various areas of knowledge, we find that students of Social and Legal Sciences top the list (79.47%), while students of Engineering and Architecture are at the bottom (63.32%). By gender, females again make greater use of social network tools for communication (78.48%) than do males (68.53%).

When asked about the value they give to the criticisms and opinions of other users when communicating online, two-thirds (66.85%) of the interviewees claim that they take these into account. No differences were found according to sex or to the area of knowledge to which they belong.

### 3.2.2. Use of tools to favor collaboration and interaction with others

The following results take us a step further into aspects of communication, and they add to our knowledge of students' preferred tools when collaborating and interacting with others (social network tools, emails, chats, video conferences, messaging).

The general data show that students prefer messaging tools (41.19%), followed by email (27.65%) and then social media tools (25.85%). Less than 6% opted for video conferencing. If we break down the data into areas of knowledge, the highest percentages correspond to messaging tools in all cases, with Engineering and Architecture at the top (42.96%) and Health Sciences at the bottom.

One result that stands out is that students of Social and Legal Sciences declare a preference for social network tools, which they rate second, over email, which occupies second place in all the other areas. Overall, the percentages—both the highest and the lowest—are very similar, and the largest difference was found in the above item (social network tools), with 29.24% in Social and Legal Sciences versus 19.13% for Engineering and Architecture. The opposite occurs for emails with Social and Legal Sciences returning the lowest figure (24.91%) versus the highest in Sciences (32.77%) and Engineering and Architecture (30.69%). By sexes, messaging tools score the highest, with females (42%) slightly ahead of males (39.33%).

It is also seen that females (88.8%) attribute more importance to interaction with others in group work than males (81.2%) and that the difference is significant,  $\chi^2(3, 2054)=22.53$ ,  $p<.001$ .

Noteworthy are the differences in the use of email and chats, with females choosing as their second option tools that have a social network, followed in third place by email, while for males the order is inverted.

Students were asked about their tool preferences when carrying out group work. The tools included Google Drive, Social Networks, the Virtual Environments of their universities, wikis, and blogs. Graph 2 shows that the responses "almost always" and "always" place Google Drive as the most used tool for group work.

When the data are considered in the light of area of knowledge, Google Drive continues to be the tool most used in all areas, especially in Engineering and Architecture (71.48%) and in Social and Legal Sciences (68.70%). Almost ten percentage points lower come to Arts and Humanities (59.09%) and Social Sciences (59.66%). Social network tools (Twitter, Facebook...) continue to appear in second place in all areas and are used mostly by students of Health Sciences (28.98%) and Arts and Humanities (28.25%). They are least used in Engineering and

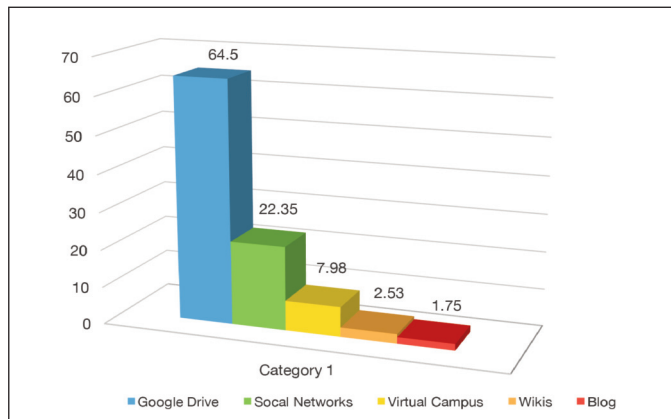


Figure 2. Students' preferred tools for group work.

Architecture, where the percentage is just half that of the areas mentioned above (14.80%). Virtual environments like Moodle or Sakai for project work occupy third place in all the areas of knowledge. Sciences (13.03%) and Engineering and Architecture (10.83%) are the areas where the virtual campus platforms are most preferred, with percentages that are not too distant from those for the social networks (20.08% and 14.63% respectively). In the case of Engineering and Architecture, the difference is just 3.5 percentage points. Blogs occupied the fourth place for Arts and Humanities (4.22%), ahead of wikis, but this was the only area of knowledge in which this occurred. In Health Sciences (0.84%) and Engineering and Architecture (0.84%), blogs receive less support as a tool to use in group projects.

### 3.2.3. Preferences and aspects valued when working in groups

Finally, we asked students about aspects they prioritize when working in teams: “building together”, “interacting with others” and “resource sharing”. The majority of the students considered all three aspects as being priorities (always/almost always or often). “Building together” is always/almost always of importance for 58.08%, and often of importance for 29.99%, giving a total of 88.07%. Sharing resources scored almost the same (87.98%), with always/almost always scoring 48.64%, and often 39.34%. The chance of “interacting with others” was also given priority with always/almost always scoring 53.70%, and often 32.81%, making a total of 86.51%. Regarding sexes, there are some notable differences regarding what is of priority when working in groups. More females responded “always/almost always” over “often” in all three cases than do males. So males’ responses varied less than females’ for these aspects. Another finding of interest is that 90.64% of the females interviewed considered “building together” a priority (64.29% always/almost always and 26.35% often), while for males thought the main priority in working in groups is “resource sharing”, with 85.88% always responding/almost always or often). The differences are significant:  $\chi^2(3, 2054) = 30.07, p < .001$ .

The order of priority students assign to working together varies according to the area of knowledge. Except for Social and Legal Sciences, the aspect most prioritized by students (always/almost always or often) is “resource sharing”. Students of Social and Legal Sciences valued “building together” highest, with 91.13% always responding/almost always or often.

Table 1 shows the results by area of knowledge for the accumulation of always/almost always and often responses.

	Resource sharing	Interacting with others	Building together
Arts and Humanities	89.61% (1)	85.07% (3)	88.96% (2)
Sciences	86.98% (1)	82.77% (3)	84.45% (2)
Health Sciences	89.49% (1)	87.05% (2)	84.01% (3)
Social and Legal Sciences	87.06% (3)	88.04% (2)	91.13% (1)
Engineering and Architecture	86.28% (1)	84.12% (3)	85.56% (2)

## 4. Discussion and conclusions

From the data in the previous section and considering the research, theory and aims presented in this paper, we are able to draw the conclusions given below about students’ online communication processes as well as their preferred tools when collaborating online with their companions.

Not communicating online is not an option for the students who participated in our research. This matches with the studies carried out by the Fundación Telefónica (2014) which reported that millions of Spaniards today are connected up to the Internet and use this connectivity as a mechanism to socialize and start friendships (Sánchez-Vera & al., 2011).

Concerning Aims 1 and 2 stated at the beginning of the paper, we affirm that both basic Internet tools (email) and social network tools are used by the vast majority of the students interviewed for communication purposes. It is important to note how the use of social media is associated with increased student learning motivation, which offers clues and new possibilities for university institutions and teachers alike.

Going a step further into communication processes, when incorporating collaboration strategies it should be kept in mind that in general students prefer instant messaging tools, according to the data provided by the Spanish Home Office (2014), which show that instant messaging is the tool most used by Spanish adolescents. Besides instant



messaging, our findings show that email and social media tools are also used by the majority of the students interviewed, while the least used tools are video conferencing and chats, in spite of the possibilities that these offer for collaboration. Instant messaging and social network tools are leading to a decline in the use of more traditional telematic tools, like wikis, video conferences or chats (García-Jiménez & al., 2013).

While Web 2.0 brought about a new paradigm of communication (O'Reilly, 2005), the social networks boom meant new channels of communication (Kolikant, 2010). Our study is in line with the above ideas, with the majority of the participants responding that their main channel of communication with companions is via social networks, that they take into consideration the online comments of others and that these networks serve to connect with people with the same learning aims. They, therefore, use the Internet and social networks intensively, as was also reported by Espuny and others (2011).

It can be seen that the web is increasingly becoming a space for learning and for connecting with other people we find interesting, and this helps students to adapt their Personal Learning Environments (Coll & Engel, 2014) and to build their own digital identity Bernete (2010). In a similar vein, it should be noted that students also consider reading other students' blogs as an important factor.

Google Drive is par excellence the preferred tool when students are working on group projects. This tool is followed by social network tools. Notably, the universities' virtual classrooms are not among students' preferred tools when working in groups, even though all the students interviewed are part of these. While there are other tools used less frequently than the virtual classroom (wikis or blogs), the virtual classroom remains some distance behind Google Drive or social networks. Furthermore, the more complex the online possibilities offered and the greater the user involvement required, e.g., link managers, the lower the interest on the part of the students, to the extent that these possibilities are scarcely used.

Although students spend a lot of time connected and online, there are many tools about which they know little or nothing, and they devote more time to those with which they familiar (White & Le Cornu, 2010).

But beyond the tools used are the motivations of students to collaborate with others. We find the greatest to be the possibility of building together and resource sharing, which are essentially Web 2.0 aspects.

Another aim of this research was to observe the data about gender and area of knowledge. While the responses show a certain homogeneity, some of the differences found between gender are worth noting. For example, females use tools with social networks more. By area of knowledge, we find that students of Social and Legal Sciences use the web for communication most, and those from Engineering and Architecture use it the least. Many Social and Legal Science degrees draw heavily on communication. The communicative and collaborative processes developed in these degrees are fostered by the universities themselves, which, we believe, explains this finding. In the same vein, we find some differences in the usage of tools that foster collaboration and interaction, since students from Social and Legal Sciences again differ from those from Engineering and Architecture, especially in their preferred messaging tools, similar to the findings by sex. It is interesting to note how, again, Social and Legal Sciences students respond differently regarding preferences when working in teams. For these students, the possibility of "building together" comes first, while in the other areas of knowledge, "resource sharing" is the main preference. This leads us to reflect on the different approaches employed within the degree courses themselves for collaborative work.

The students in this survey are online and view social networks positively (Espuny & al., 2011). Now the key is to go a step further and to make use of the spaces in which students are relating and socializing so that these become true learning opportunities.

As elements belonging to a social institution, universities have a lot to contribute in this respect, since the web offers huge opportunities for communication and collaboration that are currently being wasted because of a lack of knowledge as to how to incorporate them into educational processes. There is also a large difference between the digital competence students perceive they have acquired at university and that demanded by the professional world.

The results of our study show that our students are beginning to see the web as a learning space, so the moment is ripe for institutions of higher education to enhance and reaffirm this vision.

### Funding agency

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## References

- Anderson, P. (2002). Assessment and development of executive function (EF) during childhood. *Child Neuropsychology*, 8(2), 71-82. <https://doi.org/10.1076/chin.8.2.71.8724>
- Ato, M., López, J.J., & Benavente, A. (2013). Un sistema de clasificación de los diseños de investigación en psicología. *Anales de Psicología*, 29(3), 1038-1059. <http://doi.org/10.6018/analesps.29.3.178511>
- Bernete, F. (2010). Usos de las TIC, relaciones sociales y cambios en la socialización de las y los jóvenes. *Revista de Estudios de Juventud*, 88, 97-114. (<https://goo.gl/McdVTv>).
- Castañeda, L., & Adell, J. (2011). El desarrollo profesional de los docentes en entornos personales de aprendizaje (PLE). In R. Roig & C. Laneve (Eds.), *La práctica educativa en la Sociedad de la Información: Innovación a través de la investigación. [La pratica educativa nella Società dell'informazione: L'innovazione attraverso la ricerca]* (pp. 83-95). Alcoy: Marfil.
- Castañeda, L., & Adell, J. (Eds.) (2013). *Entornos personales de aprendizaje: claves para el ecosistema educativo en Red*. Alcoy: Marfil.
- Coll, C., & Engel, A. (2014). Introducción: los Entornos Personales de Aprendizaje en contextos de educación formal. *Cultura y Educación*, 26(4), 617-630. <http://doi.org/10.1080/11356405.2014.985947>
- Chaves, E., Trujillo, J.M., & López, J.A. (2015). Autorregulación del aprendizaje en entornos personales de aprendizaje en el Grado de Educación Primaria de la Universidad de Granada. *Revista de Formación Universitaria*, 8(4), 63-76. <http://doi.org/10.4067/S0718-50062015000400008>
- Duncan-Howell, J.A., & Lee, K.T. (2007). M-Learning: Innovations and initiatives: Finding a place for mobile technologies within tertiary educational settings. In R. Atkinson, C. McBeath, K. Soong-Swee, & C. Cheers (Eds.), *Ascilite. Singapore*. (<https://goo.gl/69Lc4M>).
- Espuny, C., González, J., Lleixà, M., & Gisbert, M. (2011). Actitudes y expectativas del uso educativo de las redes sociales en los alumnos universitarios. *Revista de Universidad y Sociedad del Conocimiento*, 8(1), 171-185. <https://doi.org/10.7238/rusc.v8i1.839>
- Fundación Telefónica (Ed.) (2014). *La Sociedad de la Información en España, 2014*. (<https://goo.gl/pHMBKe>).
- García, A., López-de-Ayala, M.C., & Catalina, B. (2013). The influence of social networks on the adolescents' online practices. [Hábitos de uso en Internet y en las redes sociales de los adolescentes españoles]. *Comunicar*, 41, 195-204. <https://doi.org/10.3916/C41-2013-19>
- Gisbert, M., & Esteve, F. (2011). Digital Learners: La competencia digital de los estudiantes universitarios. *La Cuestión Universitaria*, 1(7), 48-59. (<https://goo.gl/iBdakg>).
- Jorgensen, B. (2003). Baby boomers, Generation X and Generation Y?: Policy implications for defence forces in the modern era. *Foresight*, 5(4), 41-49.
- Kolikant, D. (2010). Digital natives, better learners? Students' beliefs about how the Internet influenced their ability to learn. *Computers in Human Behavior*, 26, 1384-1399.
- Lancaster, L.C., & Stillman, D. (2002). *When generations collide. Who are they. Why they class. How to resolve the generation puzzle at work*. Collins Business, New York.
- Marín, V., Negre, F., & Pérez, A. (2014). Entornos y redes personales de aprendizaje (PLE-PLN) para el aprendizaje colaborativo. *Comunicar*, 42(21), 35-43. <https://doi.org/10.3916/C42-2014-03>
- Martín, E., García, L.A., Torbay A., & Rodríguez, T. (2007). Estructura factorial y fiabilidad de un cuestionario de estrategias de aprendizaje en universitarios: CEA-U. *Anales de Psicología*, 23, 1-6. (<https://goo.gl/q1LvT2>).
- McCordle, M. (2006). *New generations at work: Attracting, recruiting, retaining and training generation Y*. McCordle Research. (<https://goo.gl/P4gMEu>).
- Midgley, C., Maehr, M., Hruda, L., Anderman, E., Anderman, L., Freeman, ... Urdan, T. (2000). *Manual for the Paterns off Adaptive Learning Scales*. Michigan: University of Michigan. (<https://goo.gl/RcCZBw>).
- Ministerio del Interior (Ed.) (2014). *Encuesta sobre hábitos de uso y seguridad de Internet de menores y jóvenes en España*. (<https://goo.gl/PRhKkH>).
- Mödritscher, F., Krumay, B., El Helou, S., Gillet, D., Nussbaumer, A., Albert, D., ... Ullrich, C. (2011). May I Suggest? Comparing Three PLE Recommender Str Bagies. *Digital Education Review*. (<https://goo.gl/zMjnSD>).
- Observatorio de Redes Sociales (2011). Informe de resultados del Observatorio de Redes Sociales, 3a oleada. *The Cocktail Analysis*. Febrero (<https://goo.gl/XqJg1O>).
- O'Reilly, T. (2005). What Is Web 2.0. *Pattern Recognition*, 30(1), 0-48. (<https://goo.gl/sNV04s>).
- Pardo, A., Ruiz, M.A., & San-Martín, R. (2015). *Análisis de datos en ciencias sociales y de la salud I*. Madrid: Síntesis.
- Pintrich, P., Smith, D., Garcia, T., & McKeachie, W.J. (1991). *A manual for the use of the motivated strategies of learning questionnaire (MSLQ)*. National Center for Research to Improve Postsecondary Teaching and Learning, Ann Arbor, MI. Office of Educational Research and Improvement (ED), Washington, DC.
- Prendes, M.P. (2013). CAPPLE: Explorando los PLE de los futuros profesionales. In L. Castañeda & J. Adell (Eds.). *Entornos Personales de Aprendizaje: claves para el ecosistema educativo en Red* (pp. 173-175). Alcoy: Marfil.
- Prendes, M.P., Castañeda, L., Ovelar, R., & Carrera, X. (2014). Componentes básicos para el análisis de los PLE de los futuros profesionales españoles: en los albores del Proyecto CAPPLE. *Educat*, 47. <http://doi.org/10.21556/educ.2014.47.139>
- Prendes, M.P., Castañeda, L., Gutiérrez, I., & Sánchez, M.M. (2015). Personal Learning Environments in Future Professionals: No natives or residents, just survivors. *Proceedings of III International Conference of Behaviors, Education and Psychology*. New York, 14-16 diciembre.
- Prendes, M.P., Castañeda, L., Solano, I., Roig, R., Aguiar, M.P., & Serrano, J.L. (2016). Validation of a questionnaire on work and learning habits for future professionals: Exploring Personal Learning Environments. *Relieve*, 22(2). <http://doi.org/10.7203/relieve.22.2.7228>
- Prendes, M.P., & Gutiérrez, I. (2013). Competencias tecnológicas del profesorado en las universidades españolas. *Revista de Educación*, 361, 196-222. <http://doi.org/10.4438/1988-592X-RE-2011-361-140>
- Prensky, M. (2001). Digital natives, digital immigrants. *On the Horizon*, 9(5), 1-6. <http://doi.org/10.1108/10748120110424816>
- Prensky, M. (2009). H. Sapiens digital: From digital immigrants and digital natives to digital wisdom. *Journal of Online Education*, 5(3), 1-9.

(<https://goo.gl/MBN4ol>).


Rowlands, I., & Nicholas, D. (2008). *Information behaviour of the researcher of the future*. London. University College of London.

(<https://goo.gl/iYkXBD>).

Sánchez-Vera, M.M., Prendes, M.P., & Serrano, J.L. (2011). Modelos de interacción de los adolescentes en contextos presenciales y virtuales. *EduTec*, 0, 35. <http://doi.org/10.21556/edutec.2011.35.414>

White, D., & Le-Cornu, A. (2011). Visitors and residents: A new typology for online Engagement. *First Monday*, 16(9).

<http://doi.org/10.5210/fm.v16i9.3171>



**AlfaMed**

International Researchers Network  
from Europe and Latin Aamerica  
in Media Literacy

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The AlfaMed logo features a stylized blue Greek letter alpha (α) followed by the text 'AlfaMed' in a bold, dark blue sans-serif font. Below the logo is a horizontal row of 15 circular icons, each containing the flag of a different country. The text 'International Researchers Network from Europe and Latin Aamerica in Media Literacy' is centered below the flags. A world map is shown below the text, with red and blue lines connecting various points across North and South America, Europe, and Asia. Several puzzle pieces are scattered around the map, with one piece missing from the North American continent and another from the Asian continent. At the bottom of the map area, there is a small icon of a stack of papers or a book.



# Critical thinking of young citizens towards news headlines in Chile

Pensamiento crítico de los jóvenes ciudadanos frente a las noticias en Chile

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## ABSTRACT

Strengthening critical thinking abilities of citizens in the face of news published on the web represents a key challenge for education. Young citizens appear to be vulnerable in the face of poor quality news or those containing non-explicit ideologies. In the field of data science, computational and statistical techniques have been developed to automatically collect and characterize online news media in real time. Nevertheless, there is still not a lot of interdisciplinary research on how to design data exploration platforms supporting an educational process of critical citizenship. This article explores this opportunity through a case study analyzing critical thinking ability of students when facing news dealing with the social mobilization “No+APF”. From data collected through 4 online exercises conducted by 75 secondary school students, 55 university students and 25 communication specialists, we investigate to what extent young citizens are able to classify news headlines and ideological orientation of news media outlets. We also question the influence of the media’s brand name and the subjectivity of each participant in regards to the social mobilization “No+APF”. The results underline the importance of group work, the influence of the brand name and the correlation between critical-thinking abilities and having a defined opinion.

## RESUMEN

Fortalecer el pensamiento crítico de ciudadanos frente a noticias de Internet representa un desafío educativo clave. Los jóvenes ciudadanos parecen vulnerables frente a noticias de mala calidad u orientaciones ideológicas poco explícitas. Desde la ciencia de datos se desarrollan técnicas informáticas y estadísticas para recopilar prensa digital en tiempo real y caracterizarla automáticamente. Sin embargo, existe poca investigación interdisciplinaria para diseñar plataformas de exploración de datos al servicio de un proceso educativo de ciudadanía crítica. Este artículo investiga esa oportunidad, mediante un estudio de caso en Chile que analiza la capacidad crítica del alumnado frente a noticias de un hecho social relevante: la movilización social «No+AFP». A partir de cuatro tareas en línea —realizadas por 75 estudiantes de secundaria, 55 estudiantes universitarios y 25 especialistas en comunicación— preguntamos en qué medida los jóvenes son capaces de calificar titulares de prensa y orientaciones ideológicas de medios de comunicación. Por otra parte, analizamos la influencia de la marca del medio y de la subjetividad que, frente al movimiento social «No+AFP», imprime cada participante al pensamiento crítico. Los resultados obtenidos destacan la relevancia del trabajo en grupo, la influencia de la marca del medio de prensa y la correlación entre tener una opinión definida y la capacidad crítica.

## KEYWORDS | PALABRAS CLAVE

Critical citizenship, critical thinking, media education, social mobilization, educational software, technology innovation, collective intelligence, textual analysis.

Ciudadanía crítica, pensamiento crítico, educación en medios, movilización social, software educativo, innovación tecnológica, inteligencia colectiva, análisis textual.



## 1. Introduction

### 1.1. On the vulnerability of the young citizens when facing digital news media

Recently, Reid, Radesky, Christakis, Moreno, and Cross (2016) published an article that examined the benefits and risks of digital media in the development of the youth. This research study highlighted the importance of fomenting critical thinking abilities in the youth to improve cognitive deficits, such as the scarce capacity to understand thoughts and feelings of other people after a long exposure to bad quality digital content. Similarly, interdisciplinary research works on the Information and Communication Technologies (ICT) question the spread of rumors and fake news in social networks (Kwon, Bang, Egnoto, & Raghav-Rao, 2016; Jong & Duckers, 2016). The concept “bad information” is not new; however, the social networks have considerably intensified their dissemination and impact. The phenomenon of disinformation has political and economic aspects. For example, the surge of “re-information agencies”, which imitate the discourse of news organizations, but with ideological or marketing objectives that are very often not too ethical, should be pointed out (Maigrot, Kijak, & Claveau, 2016). In this sense, filtering and critically interpreting the information consumed has become more complex for the citizens, especially the young.

To understand this phenomenon, current works in data science and artificial intelligence seek to program automated methods to evaluate the quality, truthfulness and degree of confidence of digital content (Middleton & Krivcovs, 2016; Webb & al., 2016; Maigrot & al., 2016). However, we believe that a purely technical focus does not provide solutions to the problem of strengthening the critical-thinking ability of the citizens. Data science should be integrated into methodologies that allow working on the relationship between the youth and the active reading of media. Thus, Barranquero-Carretero and Lema-Blanco (2015), for example, propose the fostering of the visualization of media from the community and/or non-profits to activate critical thinking skills. The technological contribution does not aim to replace human cognitive processes, but favor conditions for accessing better information or filtering it adequately. The present work consists of the first stage, the evaluation of how to integrate data science as part of an educational methodology on critical thinking, a challenge which will be worked on beyond the scope of this study.

### 1.2. Towards an educational method for critical thinking supported by data science

In education, various research works introduce pedagogy that is based on the concept of critical thinking citizenship (Costandius, Rosochacki, & Le-Roux, 2014; Johnson & Morris, 2012). For Johnson and Morris (2010) and Davies and Barnett (2015), this pedagogy encourages critical thinking about the past and the imagination of a possible future based on social justice, tolerance, diversity, human rights and democracy, with the objective of learning to co-exist. From the proposals by Johnson and Morris (2010), we can summarize that critical-thinking citizenry possesses two dynamics: a) Seeks the scientific rationality to analyze the data from the past; b) Recovers subjectivity and values the individuality of each individual to actively construct their thinking and their actions in the present. This is an integrated process in which both dynamics are mutually supported. Also, in the past few years, various educational methodologies have been proposed which define critical thinking when faced with printed news and propose criteria that can be worked on in the classroom (Alvarado, 2012; Fedorov, & Levitskaya, 2015). Our work does not consist on proposing a new methodology, but we seek to define guidelines to explore how data science can provide methodological and technological foundations to observe and measure critical thinking. More specifically, this article seeks to establish a baseline for the critical reading of news by a group of Chilean students, so that in the future, data science can be integrated into the construction of educational strategies.

### 1.3. What can data science provide to educational methodologies on critical thinking?

The term data science refers to the extraction of knowledge from a set of data to support human activity. This interdisciplinary science groups a set of mathematical, statistical and computer science tools that facilitate the gathering of data in real time, the pre-analysis and the organization of results in a visual and even interactive manner (Song & Zhu, 2016). There is a great number of research studies on data science that apply the automated analysis of online news, in Twitter or Facebook, for example, to characterize events (Quezada, Peña-Araya, & Poblete, 2015) or to identify publishing strategies (Vernier, Cárcamo-Ulloa, & Scheihing, 2016).

It is important to point out that in the last few years, various platforms of interactive exploration of data have been implemented to ease the work with large volumes of news articles (Devezas, Nunes, & Rodríguez, 2015; Leban, Fortuna, Brank, & Grobelnik, 2014). These resources allow for the monitoring of world events and the

identification of trends, but a tool at the service of an educational process for critical-thinking citizenry has not been designed as of yet. Starting with the results obtained in the experiment that the present article describes, we will improve “Sophia” (Vernier & al., 2016), an exploration tool of information from the press, based on text mining and data visualizations, which organizes information gathered from 290 Chilean communication outlets. The Sophia platform is available in a beta version at [www.sophia-project.info](http://www.sophia-project.info). This initiative presents the press as an educational object of study that can be used to discuss social, environmental and cultural events.

#### 1.4. Education on communication media for the citizenry

Education in and with media in Chile has an important tradition that alternates emancipative and instructional proposals: experiments in popular education within the context of democratic struggle against dictatorship (Iglesias, 2011), proposals of addition of news media in study plans and programs (De-Fontcuberta, 2009), and educational innovation with Web Social to foment socio-communicative competencies (Arancibia, Cárcamo, Contreras, Scheihing, & Troncoso, 2014). De Fontcuberta (2009) proposes, for the Chilean curriculum, the possibility of contemplating the communication media as objects for study at school, through the analysis and interpretation of television or news programs. For this author, learning is conducted through the critical understanding of media content and the reality they describe. Another possibility is a more pro-active exercise, such as creating school newspapers that can be transformed into expression tools for the students.

The technological contribution does not aim to replace human cognitive processes, but favor conditions for accessing better information or filtering it adequately. The present work consists of the first stage, the evaluation of how to integrate data science as part of an educational methodology on critical thinking, a challenge which will be worked on beyond the scope of this study.

Thinking about the media for a critical-thinking citizenry can also be related to the idea of digital “prosumers” (Islas, 2010), which has occupied a place in the school of the 21st century as a didactic innovation (Cárcamo-Ulloa, Flores, & Ramírez, 2014). However, the implementation of an educational innovation requires thinking about media competency of the school children (Ferrés & Piscitelli, 2012), considering that they face a context of media intoxication (Aguaded & Romero-Rodríguez, 2015). Today, it is necessary to keep on fostering the right of information of young citizens (Aguaded, 2014) and the development of critical thinking about the information from the press. Although we now live in an age of globalization of information, this does not create a direct link with the understanding of the world (Wolton, 2011). From education for critical thinking, Paul and Elder (2005: 11) point to the fact that without any competency in the culture of information, the students cannot become educated persons as they will not know which information they should accept and which they should reject. This critical thinking is the one that will provide the tools for the evaluation of information.

The idea of young reporters has been enriching since the time of the school newspaper by Celestín Freinet (1927) to the present. Today, the technologies of the Web 2.0 seduce us with their potential for content creation, but it is necessary to promote the production of school messages in exercises of critical thinking that also comprise the ecology of media. Scolari (2015: 29) states that the ecology of media should be understood from the following basic idea: “the communication technologies, from writing until the digital media, create environments that affect the subjects who utilize them”. Bombarded with information, today the citizenry construct opinions that are very often simplistic. Ruiz, Medina, & García (2001) became aware that a group of students made the opinions of newspaper columnists in Huelva their own, without a greater knowledge of ideological positions.

#### 1.5. Understanding the critical-thinking capacity of young citizens beginning with a specific case

The observing of critical-thinking ability to evaluate social events is a complex ideological challenge. This article

presents a study of an experimental case that seeks to characterize the critical-thinking capacity of young Chilean citizens with regards to news media. To define the main research question, we will posit the need to understand how the critical thinking of a young group of citizens acts against an important social event, by choosing the social movement “No+AFP”. From that point on, we pose the following specific research questions:

- To what degree are the youth able to qualify the ideological orientations of a news media?
- To what degree are young citizens able to differentiate news headlines that present facts in favor, neutral or against a social movement?
- Do knowledge and/or opinion as declared by the youth about social mobilizations have an influence on the capacity to qualify the media and headlines?
- Does the media’s brand have an impact on the young citizens in the way they analyze news headlines?

Section 2 of this article presents the material and methodology used in the study. Section 3 summarizes the results obtained. Lastly, section 4 discusses and reflects on these results to answer the four specific questions of the study to obtain conclusions that can guide the future development of the Sophia platform.

## 2. Materials and methods

### 2.1. Context of the case study

During the year 2016, one of the most important political events in Chile was the social mobilization against the inequalities produced by the Administrators of Pension Funds (APF). The movement, named “No+AFP” (originally “No+AFP” in Spanish), was transformed into the greatest social mobilization in the last few years and was able to manage a great number of family-attended demonstrations (1.3 million people mobilized on the streets the second day). Also, the movement allowed for concentrating the public discontent, building a national coordination with representation in the main cities. The “No+AFP” Coordinator ([www.nomasafp.cl](http://www.nomasafp.cl)) is defined as: “a citizen group that is aware that when they reach old age, they will have a pension that is a third of their current income”. According to the reports by comptroller organisms, the average amount of the pensions in Chile today rise to 197,726 pesos (300 US dollars). This figure is below the national minimum wage that is about 385 dollars, creating pockets of poverty in older adult groups.

Under the label “No+AFP”, three national marches were convened by the most important communication media. This media coverage can be explained, as the movement caters to a social problem that directly or indirectly afflicts most of the Chilean population. One of the first versions of our Sophia platform points to the fact that 290 communication media outlets mention “No+AFP” in 2371 occasions in Twitter (Figure 1). The mentions rise slightly at the end of February 2016 and are maintained until the last week of December. However, they gain strength in July, coinciding with the first day of protest (July 24th). Obviously, the greater visibility does not necessarily imply diversity in political orientations in the press, and even less a direct empathy of the media with social demands, but it is because it is a social movement that becomes part of the journalistic agenda, which is slow to disappear.

### 2.2. Participants

With the aim of answering the research questions that were previously presented in section 1.4, our methodology was based on a series of experimental tasks conducted by 155 participants at the end of the year 2016 through an online questionnaire (we detail the design of the tasks in section 2.3). The participants were divided into three

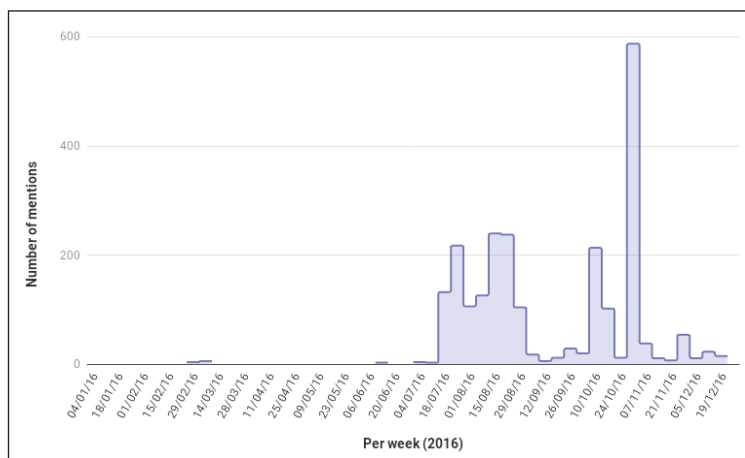


Figure 1. Evolution of mentions in the news case “No+AFP” in the Chilean media’s tweets ([www.sophia-project.info/tweets](http://www.sophia-project.info/tweets)).



categories (Table 1). The first category included 75 secondary school students from the region of Los Rios in Chile, who belonged to two education centers, a municipal center, and another public/private center, thereby diversifying their socio-economic status. The students' ages ranged from 14 to 17 years of age. The second category was composed of 55 university students from the same region. They were aged 18 to 27 years old, and originated from different faculties from the Austral University of Chile: Engineering (20), Sciences (17), Medicine (7), Philosophy and Humanities (5), Economic and Management Sciences (3), Architecture/Arts (2) and Forestry and Natural Resources (1). The third category was comprised of 25 journalists, who had more than four years of professional experience in social communication. These were professional journalists who worked in state-owned (7) and regional (7) media, public institutional chambers (6) and journalism professors (5). The invitation to participate in the online experiment was voluntary and was presented through social networks for the experts and university students. In the case of the secondary school children, the support of two education centers was handled by the Language and Communication teachers, who offered the children the opportunity to participate, and the children voluntarily went to the computer laboratory of the education center to perform the exercises.

During the performing of the tasks, the participants were asked to indicate their gender, their opinion concerning the usefulness of the "No+APF" movement, and their perception of their knowledge about the social movement. The distribution of these variables is shown in Table 1. We note the important disequilibrium in the distribution of the variable

"Opinion on the usefulness of the movement" in favor of the answer "necessary" (70% and 92% according to the groups), which

**Table 1. Demographic profile of the participants (N=155)**

		Students (Ages 14-17)		Students (Ages 18-27)		Specialists		Total	
<b>Gender</b>	Female	35	46.7%	19	34.5%	9	36%	63	40.6%
	Male	40	53.3%	36	65.5%	16	64%	92	59.4%
<b>Perception of your own knowledge of No+APF</b>	I don't know anything	9	12%	2	3.6%	1	4%	12	7.7%
	I know little	35	46.7%	15	27.3%	7	28%	57	36.8%
	I am aware	28	37.3%	33	44%	16	64%	77	49.7%
	I know a lot	3	4%	5	9.1%	1	4%	9	5.8%
<b>Opinion on the usefulness of the No+APF movement</b>	Needed	53	70.7%	45	81.8%	23	92%	121	78.1%
	Unnecessary	2	2.7%	3	5.5%	0	0%	5	3.2%
	No opinion	18	24%	2	3.6%	1	4%	21	13.5%
	No answer	2	2.7%	5	9.1%	1	4%	8	5.2%

could suggest a bias in the selection of the participants. However, this result is coherent with the national poll conducted by Cadem (2016), a public opinion research company with 40 years of experience. This study points out that 84% of those polled deemed that it was necessary to reform the forecast system of the APF.

### 2.3. Design of the tasks for gathering of data

The participants individually conducted four tasks, without external help, in an interval of time of up to 20 minutes. In the case of the secondary school students, the teachers were explicitly asked not to help in the performing of the task during the protocol. The tasks were created in the shape of a questionnaire, with the tool e-encuesta.com, where each task corresponded to a different webpage, without the possibility of backtracking.

The first task consisted in classifying 11 Chilean press media outlets by answering the following question: "Do you believe that the following media have a defined political orientation?". The participants had five possibilities for answering: "Right-wing", "Centrist", "Left-wing", "Independent", "I cannot classify it". These tasks intentionally imply complex or imprecise concepts (i.e. "Independent", "Right/Left-wing"). These are concepts that are often used to define the media in common language, but do not have, a priori, an agreed-upon definition. In this sense, this task does not have "true" or "false" answers, although it does reveal the perceptions and the critical-thinking system of analysis of each participant. To construct this task, we relied on a recent work within the context of Chilean media (Vernier et al., 2016) to select 11 Chilean media outlets on the basis of their notoriety, but maintaining a range of media outlets with different publishing strategies (i.e. "La Tercera", "El Ciudadano", "Emol", "CNN Chile") as well. According to the Sophia platform, these 11 media outlets corresponded to 34.5% of the total volume of news published on "No+APF" in 2016 in the Chilean media.

In the second task, the participants had to classify the same media by answering the following question: "Do you believe the following media offer information that is preferentially in favor, neutral or against the No+APF movement?". This task sought to verify if the participants believed or not that some of the media had a pre-concei-

ved notion towards the social movement. Evidently, a reader of the press frequently shapes an idea on the position that a media outlet adopts about the social movement. It should be mentioned that the participants always had the choice of responding that they did not know.

In the last two tasks, 22 news headlines had to be classified (44 headlines in total, all were different) starting with the question “Do you believe the following headline presents information that is in favor, neutral or against the No+APF movement?”, and with four possible answers: “In favor”, “Neutral”, “Against” or “I could not classify it”. However, in task 3 the headline was the only information available when in task 4 the headline was accompanied by the name of the media outlet. To illustrate, 4 examples of the headlines from the 44 total are presented:

- “No+APF: Protesters drive off a group of hooded persons who tried to slip into the march”.
- “No+APF: The delivery scheme allows the duplication of pensions immediately”.
- “Why, even though the APF is the theft of the century, is the Bravo Commission not aware of it?”.
- “The APF respond: ‘In Chile we have received recommendations from people that do not take responsibility for it’”.

To construct this task, we selected 4 news headlines for each of the 11 media outlets. Duplicated or similar texts were filtered, trying to diversify the themes and headline styles. In order to evaluate the influence of the presence of the media’s brand on the task of classifying the headlines, two versions of the same poll were prepared, only reversing the headlines from tasks 3 and 4. Half of the participants completed the first version of the poll and the other half completed the other version.

#### 2.4. Statistical analysis

The participant’s responses were statistically processed with R-Project, mainly through the use of three methods. The first method was used to calculate Kappa’s coefficient (Fleiss, 1971) to evaluate the reliability of agreement between the participants in each task. This measurement calculated the degree of agreement  $k$  in a classification task concerning what could occur by chance. When  $k=1$ , it means that there is total agreement among the participants. When  $k \leq 0$ , it means that the agreement is less than if the agreement occurred by chance. There is no consensus on the scale to be used to interpret  $k$ , but it is considered light ( $0.20 \leq k < 0.40$ ), medium ( $0.40 \leq k < 0.60$ ) or important ( $0.60 \leq k < 0.80$ ). This method was adapted to the context of the study to analyze the degree of intra-group and overall agreement.

The second method seeks to analyze to what measure the student’s answers were relevant. The answers provided by 25 journalists were used as the reference when at least 13 of them were in agreement on the classification of a media outlet or headline. It is important to note that the veracity of the participant’s responses was not being measured, but instead, to what degree did the responses come close to the most frequent response by the experts was evaluated. In this method, we took into account the metrics of precision (P) and sensitivity (S), which are frequently used in statistics to evaluate classification tasks. For a given category, for example, “right-wing media”, when  $P=1$  it meant that all the media that were classified as “right-wing” by a participant were classified as “right-wing” by the reference. When  $S=1$ , it meant that all the “right-wing” media given by the reference were correctly recognized by the participant. To summarize the information, we used the F1-Score (F1) metric, which represents the harmonic mean between Precision and Sensitivity. Lastly, the Pearson’s test was used to evaluate the degree of correlation between the relevance of the answer in the classification of media and headlines task, the perception of the knowledge of the movement “No+APF” and the opinion on the movement. Pearson’s test measures the linear dependency  $r$  between variables X and Y. When  $r(X,Y)=1$ , it means that there is a perfect linear correlation between the variables.

### 3. Results

#### 3.1. Analysis of intra-group agreement

Table 2 summarizes the agreement within each group of participants, according to each task and each response possible. In general, we can observe that the students were in disagreement in all the tasks. The concept of “independent media” was the object of the greatest disagreement among the students ( $k=-0.01$ ). At first sight, the tasks were very complex for the university students and the specialists. There is disagreement in all the groups except for the concepts of “right-wing” / “left-wing” media ( $k$  between 0.23 and 0.57) and the headlines “in favor” / “against” the “No+APF” movement ( $k$  between 0.26 and 0.48). It was observed that the student body, the students, and the specialists were more in agreement when recognizing a right-wing media outlet and a left-wing one. Task 2 was, undoubtedly, the most “subjective” and the least favorable to a light agreement even for the specialists.

### 3.2. Analysis of the relevance of the answers

In Table 3, the column “individual” shows the average relevance of the student body for each task. Individually, the relevance of the student body was fairly low (the overall F1-Score varied between 0.27 and 0.39 according to the tasks). The student body was somewhat more able in classifying news headlines in favor or against, but the score stayed below 0.5. As shown in the previous section, the student body did not reach an agreement amongst themselves and did not have the same criteria of interpretation as the specialists. However, in the column “group”, we took into account, for the calculation of relevance, the most-common response given by each group of participants. It was observed that collectively, the student body responded with a relevance of 0.90 when classifying media, and between 0.62 and 0.75 when classifying headlines. These results were similar, or sometimes better, than the results obtained individually by an average student or specialist.

Lastly, a difference was observed in the classification of headlines results when the participants knew the media outlet or did not. For example, the headline “The APF” responded: ‘In Chile, we have received recommendations from people that do not take responsibility for the media outlet’. “El Desconcierto” (literally “The Bewilderment”), was classified as “Against” the No-APF when the specialists did not know the media, and “In favor” when they knew it. According to the specialists, “El Desconcierto” is a “left-wing” media. Of the 44 headlines that were to be classified, five headlines were classified differently by the specialist’s group when they knew the media outlet, six headlines by the student body group and four headlines by the student group. All the changes went in the direction of the ideological stereotype associated to the media outlet by the group in question.

### 3.3. Correlation analysis

Tables 4 and 5 show the results obtained by the correlation analysis when taking into account all the participants (Table 4) or only the secondary school students (Table 5). In the first place, it was observed that there was a clear

correlation between having a great degree of relevance in task 3 (F1\_T3) and task 4 (F1\_T4) ( $r=0.76$  for the participants,  $r=0.68$  for the student body). They were similar tasks. The correlation between a

**Table 2. Intragroup agreement in the different tasks (Fleiss' Kappa  $\kappa$ )**

		Students (Aged 14-17)	Students (Aged 18-27)	Specialists
<b>Task 1:</b> Classify media according to their political orientation	Right-wing	0.07	0.33	0.57
	Left-wing	0.03	0.23	0.48
	Centrist	0.03	0.07	0.18
	Independent	-0.01	0.02	0.04
	<b>Overall agreement</b>	<b>0.03</b>	<b>0.17</b>	<b>0.35</b>
<b>Task 2</b> Classify media according to ideological orientation against No+APF	In favor	0.01	0.14	0.32
	Against	0.05	0.21	0.20
	Neutral	0.02	0.12	0.17
	<b>Overall agreement</b>	<b>0.03</b>	<b>0.13</b>	<b>0.16</b>
<b>Task 3:</b> Classify headlines knowing the name of the media outlet	In favor	0.08	0.26	0.28
	Against	0.08	0.30	0.48
	Neutral	0.03	0.15	0.19
	<b>Overall agreement</b>	<b>0.05</b>	<b>0.21</b>	<b>0.28</b>
<b>Task 4:</b> Classify headlines without knowing the name of the media outlet	In favor	0.10	0.34	0.27
	Against	0.10	0.36	0.44
	Neutral	0.03	0.18	0.10
	<b>Overall agreement</b>	<b>0.06</b>	<b>0.26</b>	<b>0.25</b>

**Table 3. Relevance score of the answers (F1-Score)**

		Students (Aged 14-17)		Students (Aged 18-27)		Specialists	
		Individual	Group	Individual	Group	Individual	Group
<b>Task 1:</b> Classify media according to their political orientation	Right-wing	0.33	0.89	0.66	0.89	0.83	1.00
	Left-wing	0.27	1.00	0.48	1.00	0.73	1.00
	Centrist	0.22	0.80	0.29	0.80	0.57	1.00
	<b>Overall agreement</b>	<b>0.27</b>	<b>0.90</b>	<b>0.48</b>	<b>0.90</b>	<b>0.71</b>	<b>1.00</b>
<b>Task 3:</b> Classify headlines knowing the name of the media outlet	In favor	0.41	0.58	0.60	0.81	0.69	1.00
	Against	0.40	0.80	0.66	0.90	0.81	1.00
	Neutral	0.37	0.47	0.54	0.76	0.65	1.00
	<b>Overall agreement</b>	<b>0.38</b>	<b>0.62</b>	<b>0.60</b>	<b>0.83</b>	<b>0.72</b>	<b>1.00</b>
<b>Task 4:</b> Classify headlines without knowing the name of the media outlet	In favor	0.49	0.86	0.72	1.00	0.63	1.00
	Against	0.41	0.81	0.69	0.91	0.75	1.00
	Neutral	0.27	0.58	0.47	0.80	0.58	1.00
	<b>Overall agreement</b>	<b>0.39</b>	<b>0.75</b>	<b>0.63</b>	<b>0.90</b>	<b>0.66</b>	<b>1.00</b>

high relevance for the classification of media outlets task (F1\_T1) and a high relevance for classifying headlines ( $0.53 < r < 0.65$ ) was more interesting. This result tended to show that classifying headlines was not only a text analysis task, but it also implied a certain knowledge of news media outlets. It could also be interpreted that the abilities of text analysis were perfected when one knows the discourse mechanisms of the press. Later, especially when considering the student body, a stronger correlation was observed between the knowledge perceived on the No+APF and the relevance when classifying headlines ( $0.38 < r < 0.45$ ). This result can re-enforce the idea that becoming interested in events of social mobilization and the analysis of text are mutually supported competencies.

**Table 4. *r* correlation scores between variables**  
(*p* value < 0.01)

	Knowledge	Opinion	F1_T1	F1_T3
Opinion	0.29	-		
F1_T1	0.32	0.18	-	
F1_T3	0.36	0.36	0.65	-
F1_T4	0.30	0.35	0.60	0.76

#### 4. Discussion and conclusions

The results presented allow us to answer specific research questions, to later provide some general thoughts that will allow for the development, in future works, of a methodology that uses data science to the service of critical thinking when dealing with journalistic information. These proposals ratify the needs raised by media education research (Alvarado, 2012; Fedorov, & Levistkaya, 2015) of proposing strategies that contribute to the critical reading of information.

**Table 5. *r* correlation scores between variables only with student's data**  
(*p* value < 0.01)

	Knowledge	Opinion	F1_T1	F1_T3
Opinion	0.40	-		
F1_T1	0.30	0.10	-	
F1_T3	0.45	0.44	0.53	-
F1_T4	0.38	0.40	0.54	0.68

##### 4.1. Critical-thinking ability of the young citizens with regards to news media and headlines

In light of the results, the tasks could have appeared difficult for the secondary school students, as they had little agreement amongst themselves, and their answers had a weak average relevance. It was also observed that for this group of students, the average percentage of the answer "I could not classify it" was 56% for the media outlets and 19% for the headlines, as compared to 13% and 2% for the specialists (12% and 10% for the university students). However, it was observed that the wisdom of crowds could help resolve the challenges well. The concept of wisdom of crowds (Surowiecki, 2004) proposes that often, the decision or evaluations that the group defines are better than what a single individual could think of. Under these principles, and in agreement with Ruíz and others (2001), we can conclude that the secondary school students effectively have an individual capacity that is very fragile, but it is sufficient for contributing to the group's thinking. The university students have a critical-thinking ability that is more refined, but it would also be more effective to compare their thoughts as a group. On the other hand, concepts such as "independent/centrist media" were very subjective for secondary school and university students. It should also be pointed out that these categories were also somewhat confusing even for the specialists.

##### 4.2. Previous knowledge and brand: factors of influence on critical-thinking capacity

Our last research questions were focused on the impact of the three variables on critical-thinking ability: a) previous knowledge of the social movement, b) personal opinion on the movement and c) the influence of the media's brand. The results obtained showed that in secondary school students, more than in the other groups, the degree of knowledge of the social movement and having an opinion was correlated with the capacity of classifying headlines. This results corroborates the definition of critical-thinking citizenry by Johnson and Morris (2010), indicating that the subjectivity of the critical-thinking citizenry (having an opinion on the No+APF movement, or at least being aware of it) is correlated to an analytical dynamic (thinking about the meaning of a statement and the orientation of a source).

Lastly, the secondary school and university students seemed to be more influenced by the media's brand, but just as the specialists. They took into account the source of information for the re-evaluation of a statement within its context. We believe that this shows a certain critical-thinking ability that could be strengthened through the development of the ability to identify the news source and the analysis of its potential ideological orientations, specifically when the source is unknown. These situations are in agreement with proposals by Fedorov and Levistkaya (2015).

##### 4.3. Strengthen the critical-thinking citizenry with data science tools

The study presented contributes clues or reflections for the design of exploration of data platforms to the service

of critical thinking about the news. We suggest the adoption of instructional design that foments group work for the performing of analysis of media tasks. The platform could gather the opinion of each participant and highlight the differences in points of view. Also, it would be interesting to show the different ideological orientations of the media outlets and constructively debate to understand why each individual has a different opinion. The data science techniques can help with the compilation of diverse data, incorporating third sector media and exploring the relationship of the youth with this media type (Barranquero-Carretero & Lema-Blanco, 2015), and could also technologically support a diverse, independent and decentralized critical reading to drive human analysis. This last is irreplaceable when designing critical thinking. In this sense, we suggest that the platform propose a scenario of data exploration through the use of a set of tags to qualify media outlets, news, headlines or signs of subjectivity, while at the same time allowing the users to create their scenarios of analysis and tags. Lastly, the application could highlight interesting cases to be interpreted or citizen's problems that, for the teaching staff and/or the student body, promote critical-thinking exercises and the use of data science to drive network interactions.

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### References

- Aguaded, I. (2014). From infoxication to the right to communicate. [Desde la infoxicación al derecho a la comunicación]. *Comunicar*, 42, 7-8. <https://doi.org/10.3916/C42-2014-a1>
- Aguaded, I., & Romero-Rodríguez, L. (2015). Mediamorfosis y desinformación en la infoesfera: Alfabetización mediática, digital e informacional ante los cambios de hábitos de consumo informativo. *Education in the Knowledge Society*, 16(1), 44-57. <https://doi.org/10.14201/eks20151614457>
- Alvarado, M. (2012). Critical reading of media: A methodological proposal. [Lectura crítica de medios: Una propuesta metodológica]. *Comunicar*, 20(39), 101-108. <https://doi.org/10.3916/C39-2012-02-10>
- Arancibia, M., Cárcamo, L., Contreras, P., Scheihing, E., & Troncoso, D. (2014). Re-pensando el uso de las TIC en educación: Reflexiones didácticas del uso de la Web 2.0 en el aula escolar. *Arbor*, 190, 766. <https://doi.org/10.3989/arbor.2014.766n2014>
- Barranquero-Carretero, A., Lema-Blanco, I. (2016). *La juventud española y los medios del Tercer Sector de la Comunicación*. Madrid: Centro Reina Sofía sobre Adolescencia y Juventud /FAD. ([goo.gl/EGRfJ3](http://goo.gl/EGRfJ3)).
- Cadem (2016). Track semanal de opinión pública, 16 de Agosto 2016, *Estudio #135*. (<http://goo.gl/QJj6dQ>).
- Cárcamo-Ulloa, L., Flores, P., & Ramírez, J. (2014). Didactic innovations through YouTube and Gigapan: Teachers' perceptions in classrooms in southern Chile. *Creative Education*, 5. <https://doi.org/10.1071-1079.10.4236/ce.2014.512121>
- Costandius, E., Rosochacki, S., & Le-Roux, A. (2014). Citizenship education and community interaction: A reflection on practice. *International Journal of Art & Design Education*, 33(1), 116-129. <https://doi.org/10.1111/j.1476-8070.2014.01773.x>
- Davies, M., & Barnett, R. (Eds.) (2015). *The Palgrave handbook of critical thinking in higher education*. New York: Palgrave Macmillan US. <https://doi.org/10.1057/9781137378057>
- De Fontcuberta, M. (2009). Propuestas para la formación en educación en medios en profesores chilenos. *Comunicar*, 32, 201-207. <https://doi.org/10.3916/c32-2009-03-001>
- Devezas, T., Nunes, S., & Rodríguez, M. (2015). MediaViz: An interactive visualization platform for online media Studies. In *Proceeding of the 2015 International Workshop on Human-centric Independent Computing*, Guzelyurt, Northern Cyprus, 7-11. <https://doi.org/10.1145/2808469.2808474>
- Fedorov, A., & Levitskaya, A. (2015). The framework of media education and media criticism in the contemporary world: The opinion of international experts. [Situación de la educación en medios y la competencia crítica en el mundo actual: opinión de expertos internacionales]. *Comunicar*, 23(45), 107-116. <https://doi.org/10.3916/C45-2015-11>
- Ferrés, J., & Piscitelli, A. (2012). Media Competence. Articulated Proposal of Dimensions and Indicators. [La competencia mediática: propuesta articulada de dimensiones e indicadores]. *Comunicar*, 38, 75-82. <https://doi.org/10.3916/C38-2012-02-08>
- Fleiss, J.L. (1971). Measuring nominal scale agreement among many raters. *Psychological Bulletin*, 76(5), 378-382. <https://doi.org/10.1037/h0031619>
- Freinet, C. (1927). *L'imprimerie à l'école. Brochures d'éducation nouvelle populaire*. Boulogne, Ferrary.
- Fung, I.C.H., Fu, K.W., Chan, C.H., Chan, B.S.B., Cheung, C.N.,... Tse, Z.T.H. (2016). Social media's initial reaction to information and misinformation on Ebola, August 2014: Facts and rumors. *Public Health Reports*, 131(3), 461-473. <https://doi.org/10.1177/003335491613100312>
- Iglesias, M. (2011). *Rompiendo el cerco: el movimiento de pobladores contra la dictadura*. Santiago: Radio Universidad de Chile.
- Islas, O. (2010). Internet 2.0: El territorio digital de los prosumidores. *Estudios Culturales*, 5(3), 43-64. (<http://goo.gl/RJjK6b>).
- Johnson, L., & Morris, P. (2010). Towards a framework for critical citizenship education. *The Curriculum Journal*, 21(1). <https://doi.org/10.1080/09585170903560444>
- Johnson, L., & Morris, P. (2012). Critical citizenship education in England and France: A comparative analysis. *Comparative Education*, 48(3), 283-301. <https://doi.org/10.1080/03050068.2011.588885>
- Jong, W., & Duckers, M.L. (2016). Self-correcting mechanisms and echo-effects in social media: an analysis of the 'gunman in the newsroom'

- crisis. *Computers in Human Behaviour*, 59, 334-341. <https://doi.org/10.1016/j.chb.2016.02.032>
- Kwon, H.K., Bang, C.C., Egnoto, M., & Raghav-Rao, H. (2016). Social media rumors as improvised public opinion: semantic network analyses of twitter discourses during Korean saber rattling 2013. *Asian Journal of Communication*, 26(3). <https://doi.org/10.1080/01292986.2015.1130157>
- Leban, G., Fortuna, B., Brank, J., & Grobelnik, M. (2014). Event registry: Learning about world events from news. In *Proceeding of the 23rd International Conference on World Wide Web* (pp. 107-110). <https://doi.org/10.1145/2567948.2577024>
- Maigrot, C., Kijak, E., & Claveau, V. (2016). Médias traditionnels, médias sociaux: Caractériser la réinformation. *TALN 2016 - 23ème Conférence sur le Traitement Automatique des Langues Naturelles*, Jul. 2016, Paris, France. (<http://goo.gl/2Lrzze>).
- Middleton, S., & Krivcovs, V. (2016). Geoparsing and geosemantics for social media: Spatiotemporal grounding of content propagating rumors to support trust and veracity analysis during breaking news. *ACM Transactions on Information Systems*, 34(3). <https://doi.org/10.1145/2842604>
- Paul, R., & Elder, L. (2005). *Estándares de competencia para el pensamiento crítico. Estándares, principios, desempeño, indicadores y resultados con una rúbrica maestra en el pensamiento crítico*. Dillon Beach: Fundación para el Pensamiento Crítico. (<http://goo.gl/UMVRP1>).
- Quezada, M., Peña-Araya, V., & Poblete, B. (2015). Location-aware model for news events in social media. In *Proceedings of the 38th Annual ACM SIGIR Conference*. Santiago, Chile. <http://doi.acm.org/10.1145/2766462.2767815>
- Reid, Y., Radesky, J., Christakis, D., Moreno, M., & Cross, C. (2016). Children and adolescents and digital media. *Pediatrics*, 138(5). <https://doi.org/10.1542/peds.2016-2593>
- Ruiz, A., Medina, M., & García, L. (2001). ¿Fomenta la prensa onubense la integración de los inmigrantes en nuestra sociedad? *Comunicar*, 17, 176-179. (<http://goo.gl/Lrg92C>).
- Scolari, C. (2015). *Ecología de los medios: entornos, evoluciones e interpretaciones*. Madrid: Gedisa.
- Song, I.Y., & Zhu, Y.J. (2016). Big data and data science: what should we teach? *Expert Systems*, 33(4), 364-373. <https://doi.org/10.1111/exsy.12130>
- Surowiecki, J. (2004). *The wisdom of crowds*. New York: Anchor.
- Vernier, M., Cárcamo-Ulloa, L., & Scheihing, E. (2016). Diagnóstico de la estrategia editorial de medios informativos chilenos en Twitter mediante un clasificador de noticias automatizado. *Revista Austral de Ciencias Sociales*, 30, 183-201. ([goo.gl/D7msKH](http://goo.gl/D7msKH)).
- Webb, H., Burnap, P., Procter, R., Rana, O., Stahl, B.C., Williams, M., ... Jirotko, M. (2016). Digital wildfires: Propagation, verification, regulation, and responsible innovation. *ACM Transactions on Information Systems*, 34(3). <https://doi.org/10.1145/2893478>
- Wolton, D. (2011). *Informar no es comunicar*. Madrid: Gedisa.

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