MLS - EDUCATIONAL RESEARCH (MLSER)
http://mlsjournals.com/Educational-Research-Journal
ISSN: 2603-5820

(2024) MLS-Educational Research, 8(1), 23-39 . doi: dx.doi.org/ mlser.v8i1.2116

THE IMPORTANCE OF THE APPLICATION AND USE OF SOCIAL NETWORKS IN THE POPULARIZATION OF SCIENCE AIMED AT YOUNG UNIVERSITY STUDENTS

LA IMPORTANCIA DE LA APLICACIÓN Y USO DE LAS REDES SOCIALES EN LA DIVULGACIÓN CIENTÍFICA DIRIGIDA A JÓVENES UNIVERSITARIOS

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Manuscript information:

Received: 17/04/2023
Reviewed: 13/07/2023
Accepted: 16/08/2023

Keywords:
social networks, popular science, university students, science, academic journals

ABSTRACT

The aim of this research is to show the importance of exploring and applying new ways or channels of dissemination in accordance with current needs and demands, in order to reach a young audience in terms of dissemination and scientific knowledge. For this reason, this study aims to demonstrate not only the effectiveness, but also the value that young university students give to social networks as one of the main channels for consulting information. To this end, a survey was carried out among 188 students from fourteen university degrees to find out and assess the reasons for their lack of interest in reading and consulting scientific journals and publications. In this sense, one of the problems facing Spanish science popularisation is the lack of existing and applicable means of dissemination, especially if one wishes to reach a young audience. In this way, it underlines the idea that social networks can be a potential channel for the dissemination and wider reach of scientific knowledge in any area. For all these reasons, the present study would lead to a new approach which would allow to address the strategies to be developed by academic journals in those social networks where more young university students are concentrated.

Palabras clave:

RESUMEN

La presente investigación tiene como objetivo, mostrar la importancia de explorar y aplicar nuevas vías o canales de difusión acordes a las necesidades y demandas actuales, para llegar a un público joven en materia de divulgación y conocimiento científico.

redes sociales, divulgación científica, universitarios, ciencia, revistas académicas	Es por ello, que a través de este estudio se pretende evidenciar no solo la eficacia, sino también, el valor que los jóvenes universitarios dan a las redes sociales como uno de los principales canales de consulta de información. Para ello, se ha realizado una encuesta a 188 estudiantes de catorce grados universitarios a través de la cual, se ha podido conocer y valorar los motivos de su escaso interés en la lectura y consulta de revistas y publicaciones científicas. Observando en este sentido, cómo uno de los problemas a los que se enfrenta la divulgación científica española es la falta de medios de difusión existentes y aplicables, especialmente si se desea llegar a un público joven. De este modo, se subraya la idea de que las redes sociales pueden ser un canal potencial para la difusión y mayor alcance del conocimiento científico en cualquier área. Por todo ello, el presente estudio llevaría a un nuevo planteamiento el cual permita abordar las estrategias a desarrollar por parte de las revistas académicas en aquellas redes sociales donde se concentran más jóvenes universitarios.

Introduction

The hypothesis that articulates this article is based on whether the importance and power that social networks have as communication channels is really useful for scientific dissemination, especially if we want to reach a young audience such as Spanish university students. It is understood that the use of these, favors a greater reach and new ways of dissemination without forgetting the consideration and role of the traditional media.

The study or review on the perception of students in relation to scientific and popularization matters is not something new. Several investigations have previously addressed this problem, such as, for example, the consultation carried out by the University of Oviedo between 2010 and 2011 to 161 students in order to know their impression of scientific dissemination in the press and its contribution to scientific culture, obtaining as a result that:

> "All groups agreed on the low scientific culture of Spaniards; 61.29% attributed it to poor scientific dissemination, while the remaining 38.71% considered that dissemination is adequate, there is sufficient information in newspapers and in an appreciable number of magazines, in addition to television and the Internet" (Cantabrana et al., 2015, p.47)

As well as, the report conducted in seven faculties of the National University of Pilar (Paraguay) in 2017 in order to measure both the perception, as well as attitudes towards scientific research through a sample of 358 participants, which highlights:

> Weaknesses in the development of students' abilities to present projects in calls for proposals; scarce participation in scientific dissemination events; little use of scientific articles by professors in their lectures; as well as the need for greater emphasis on the teaching of the scientific method. At the institutional level, there is a lack of promotion of research departments and, above all, of linking research activities with students. (Ortega, 2018, p.108).

Similarly, interesting scientific publications related to this topic have been found and consulted (Berrios Aguayo et al. 2020). These, together with institutional reports such as the Spanish University System Facts and Figures report on the 2021-2022 academic year or those published by the Spanish Foundation for Science and Technology (FECYT), have made it possible to put the figures surrounding the academic world on the table in order to create an approach that links science with young people.

For example, according to the annual report of the Spanish University System (SUE) for the 2020-2021 academic year, the university network is composed of the following figures: 84 universities are in operation, of which 50 are public and 34 are private, resulting in 1,067 university centers between schools and faculties, 544 university research institutes, 52 doctoral schools, 56 university hospitals and 77 foundations, and 3,062 undergraduate degrees, resulting in 1,679,518 enrolled students between Bachelor's and Master's degrees.

Statistics suggest that young college students are interested in their own education and in academia. In this work, our objective is to discover, in addition to their perception of science and science popularization, the value of the use of social networks as a means of dissemination, making reference to social networks such as YouTube, Instagram or TikTok.

Undoubtedly, science plays an important role in today's society because it allows and enables the creation of a more prepared and knowledgeable society in different areas through research and dissemination. Furthermore, it is defined as a "rational, systematic,

accurate, verifiable and, therefore, fallible knowledge" (Bunge, 2018, p. 7), and provides a broader understanding of the universe and the world around us.

All the factors or processes that contribute to its creation are essential for the achievement of specific objectives and results due to this purpose. This research aims to demonstrate the relevance of investigating and implementing new forms of dissemination adapted to current demands, such as social networks, to reach a young audience and understand their perception of scientific publications and journals. Thus, Voytek (2017) states that social networks "in addition to their use as a communication tool between scientists and the public and media, are research tools that scientists are leveraging for their research" (p.1220).

Likewise, and in relation to the importance of digital applications for young university students, it is worth mentioning the concept of *open science*, understood as the paradigm of doing science by betting on the creation, dissemination and storage of research in a public way. Méndez (2021) provides the following definition to this term of open science: "is the expression with which we designate the practice of sharing the knowledge resulting from publicly funded research in a completely open, free and unrestricted way" (p.2). Likewise, and expanding on the definition provided on the web page, *research* section, of the University of Castilla La-Mancha:

> It is a movement promoted by the OECD countries and encouraged by the European Commission, which advocates free access by citizens to the results of scientific research, data, resources, results, thoughts, as well as the results and discoveries of scientific research to be universally accessible and without restrictions.

In addition, in 2016 the European Commission's Directorate-General for Research and Innovation published the document *Open Innovation, Open Science, Open to the World*, which provides an answer to the "three O's" and which if translated into Spanish would give rise to the "three A's" open innovation, open science and openness to the world. The purpose of the book was to mark the route of the different actions that allow science and innovation access to scientific publications, the possibility of collaborations between different researchers, as well as their training, which implies changes in the technological and scientific infrastructures of the traditional system. And for all of the above, the purpose of information science is:

> To create conditions to gather institutionalized information and distribute it in an appropriate way to a public that, judging its importance, will value it in order to use it for the development of the individual and the spaces he/she inhabits. (de Alburquerque, 2001, p.24)

Scientific dissemination

Regarding scientific dissemination, we recover a simple and clear definition given by Belenguer (2003) in which the author defines the term dissemination as "the diffusion or extension of something in a way that is accessible and intelligible to the population" (p.45). However, as a more academic definition, it is necessary to cite the one issued by F. De Lionnais in the debate held at the Association of Science Writers in 1958, and to which Belenguer also refers:

> What we understand by Scientific Dissemination is precisely this: any activity of explanation and dissemination of knowledge, culture and scientific and technical thought, under two conditions, with two reservations: the first is that these explanations and this dissemination of scientific and technical thought be made outside the official education or equivalent teachings... The second

> reservation is that these extracurricular explanations are not intended to train specialists, nor to perfect them in their own specialty, since, on the contrary, we claim to complete the culture of specialists outside their specialty. (Quoted in Belenguer, 2003, p.46).

With both definitions we understand that outreach, in this case scientific, has as its premise to reach everyone equally, regardless of socioeconomic and educational level, so that scientific production is not framed within the same scenario as the academic for the benefit of a few. Along the same lines, Fundora and García (2021) understand science popularization as "bringing science closer to the general, non-specialized public; it is any activity of explanation and dissemination of knowledge, culture and scientific and technical thought" (p.92). For their part, Massarani and Moreira (2004) in their article on *Popularization of science: historical perspectives and permanent dilemmas*, claim that "the popularization of science must be included in a sufficiently broad collective process, involving research institutions, universities, governments, as well as the actors that weave these threads: scientists, communicators, journalists, researchers and students" (p.35). In addition, other authors have stated the following:

> The media focused on the popularization of science must also respond to this set of transformations introduced by Web 2.0 that affect the design, production and distribution of content. This aspect is affected by the growth of interest in science that has occurred exponentially over the last few years, from 6.9% in 2004 to 16% in 2016 (Calvo et al., 2018, pp. 294-295).

Society's growing interest in science in recent years has led many scientific journals to reinvent themselves:

> The interest shown by Spanish citizens in science and technology has been increasing over the last ten years. According to the 2019 Annual Biotechnology Report of the Spanish Association of Biocompanies (AseBio), interest in science and technology grew over the last decade to 16.3% in 2018. This means that one out of every six people spontaneously expresses interest in scientific and technological topics. (Cebrián, 2020, para.1)

Along the same lines, at the national level, the Spanish Foundation for Science and Technology (FECYT) conducted in 2020 the *10th Survey of Social Perception of Science* , which involved the participation of eight thousand surveys throughout the country, from which we extract the following result:

> A large majority believe that more should be invested in science and technology at all levels of public administration and private companies. This demand is greater towards the Government of Spain, supported by 85% of the population. 80% believe that regional governments should increase investment in science and technology research, along with 71% who believe that local administrations and private companies should do so. (FECYT, 2020, p.4).

In 2021, the FECYT Foundation created the *Ranking of Visibility and Impact of Spanish Scientific Journals in the Humanities and Social Sciences*. Of the 518 journals submitted, 514 renewed the FECYT Quality Seal and were divided into one or two thematic categories. Comunicar magazine, which focuses on communication and education, received the highest rating. It stands out for publishing quarterly articles in English and Spanish, with summaries in several languages, and its presence in social networks such as Facebook, Twitter and LinkedIn increases its dissemination and impact. The journal is internationally recognized as a leader in its field and has demonstrated its

successful scientific dissemination through a variety of channels, including social networks.

Similarly, the quality of publications in scientific journals should be taken into account. Therefore, according to Leotau (2006), the impact factor is the most common tool used at the international level to determine their condition. It is an instrument applied by the most relevant databases and by the entire research sector for the publication of papers (p.6).

Scientific journals

Scientific journals face challenges in the dissemination and diffusion of research, and it is important to consider the audience. Scientific dissemination guarantees the presence of knowledge and culture in society, while diffusion allows them to be understood and accepted, opening the door to future research (Ramírez et al., 2012). Additional efforts must be made to expand knowledge and transmit information to a society interested in learning and knowing its environment. Scientific journals are seen as a "medium that allows scientific communication and as a mechanism to assist in the quality control of research inputs, in order to strengthen technological developments and innovation processes" (Ramírez et al., 2012, p.49).

It is interesting to mention the origin of scientific journals before continuing with the present work, situating the interest in science and new fields of research, starting in the second half of the 17th century.

The new way of creating knowledge was adopted by scientific societies created outside the universities, because in the official education system of the time, the academic structures still dated back to the medieval period and their organization did not allow the implementation of the new experimental methods.

The societies began as associations that grouped people interested in certain topics and when they accumulated associates and reached a certain solidity, they became officially recognized national scientific academies. (Mendoza and Paravic, 2006)

This group of intellectuals sought to transmit knowledge in an easier way than that presented in the books of the time. However, the demand for this work of adapting the knowledge made it impossible to carry out the task in its entirety, which is why we resorted to the elaboration of fragments that anticipated, as a summary, the treatise of the work under the publication of journals. "The first scientific journals were the *Journal de Sçavans* in France and the *Philosophical Transactions of the Royal Society*, in London" (Mendoza and Paravic, 2006, p.53). Thus, a scientific correspondence was generated between London and Paris and was known as *Republique des Lettres*:

> In 1622 the *Royal Society* was founded in London and the *Académie Royale des Science* , now called *Académie des Science*, in France. To disseminate their discoveries, they adopted the trusted mail system that was being practiced in several European courts to exchange diplomatic correspondence. Thus, communication between researchers was streamlined, and along with the intellectual content of each letter, scientists gradually began to add comments, evaluations and judgments, which formed a method of critical expression of new discoveries. (Mendoza and Paravic, 2006, p.53)

On the other hand, and moving forward in time, de Alburquerque (2001) refers to both the structure and the transition that popular science journals have undergone in relation to the changes established in the field of communication after the irruption of new technologies:

> From the transition from a written to an electronic modality, a mutation that today, in terms of making science public, has meant that scientific journals have been forced to move from a written communication, typical of a typographic culture, to a cybernetic communication, typical of an electronic culture (Cited by Mendoza and Paravic, 2006, p.51)

Social networks as a means of communication

To better understand their role as a means of communication and information dissemination, social networks can be divided into two groups. In the first group are organizations that focus on scientific and academic outreach. The second group includes the rest of the social networks, such as Facebook, YouTube, Instagram and TikTok, which have broader objectives and focus on different targets depending on their structure.

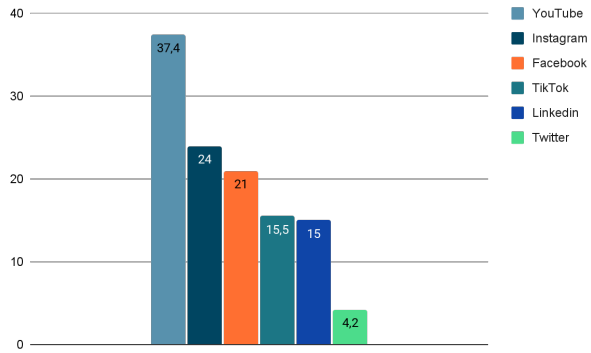
In an article published on the Inter-American Development Bank blog, Dr. Antonio Moneo (2014) highlighted three specialized applications: Mendeley, Academia.edu and ResearchGate. Platforms dedicated to the exchange of scientific data are gaining popularity in other social networks that function as online communities where users with academic profiles share and interact with other researchers. Campos-Freire and Rúas-Araújo (2016) also mentioned the role of scientific social networks as interaction platforms and mentioned examples such as LinkedIn, Academia.edu, ResearchGate, Scilink and Nature Network, as well as how these digital networks change the dynamics of scientific communication by accelerating the knowledge feedback loop.

Social networks offer several advantages for academia. They allow the creation of working groups among researchers, who can present their publications and academic training in their professional profiles. They also facilitate the dissemination of updated information on seminars, conferences, publications, job offers and other relevant news. These networks are connected to search engines, which use metrics to evaluate authors and publications. According to Roig-Vila et al. (2010), social networks are scientific communities that use participatory and communicative technologies to exchange information, and the Internet enhances relationships between specialists and promotes the development of their research activities.

In the same vein, another platform is worth mentioning: *InfluScience*, a space born through a project submitted in the 2019 call for the National Plan funded by the State Research Agency of the Spanish Ministry of Science and Innovation, with the aim of publicizing and visualizing scientists, whose work has managed to achieve a strong presence in social media between 2016 and 2020. According to the data provided, the profiles of 4,209 people and 4,697 scientific articles disseminated through social networks are established, with articles related to the medical area having the greatest impact through these channels.

The second group of the ranking, and attending to the number of users, we find YouTube (2005), Facebook (2004) and Instagram (2010), followed by TikTok (2016), LinkedIn (2002) and Twitter (2006). Figure 1 below shows the number of users of the main social networks in Spain, with YouTube leading the *ranking* with 37.4 million users, followed by Instagram's 24 million.

Figure 1
Ranking of social networks in Spain



Note. The graph shows the number of users of the 6 main social networks in Spain. Own elaboration. november 18, 2022. Source: https://unavidaonline.com/estadisticas-redes-sociales/#ranking españa

Social networks are mass communication channels that allow people with profiles on these platforms to share information, opinions and thoughts. These networks stand out for the interaction among users, constant updating and immediacy. Likewise, they are defined by the Pan-Hispanic Dictionary of Legal Spanish (2022) as:

> An information society service that offers users a communication platform through the Internet so that they can generate a profile with their personal data, facilitating the creation of communities based on common criteria and allowing the communication of its users, so that they can interact through messages, share information, images or videos, allowing these publications to be immediately accessible by all the users of their group.

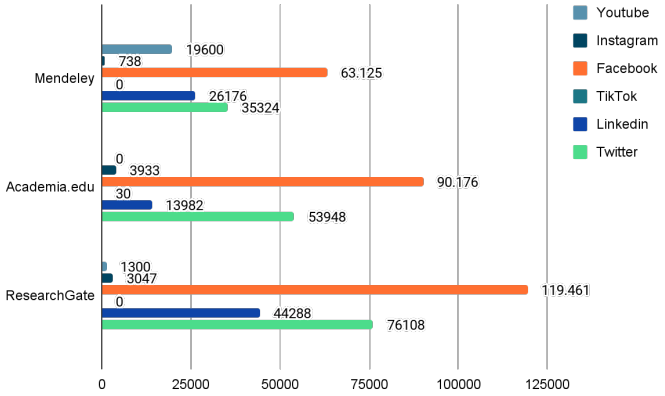
According to the latest *Digital 2022 global* report by We Are Social and Hootsuite (2022) the number of registered users on social networks is equivalent to more than 58% of the world's population. Therefore, it is a mistake to consider that social networks are used exclusively by a young audience, since the study sample includes people aged between 16 and 64 years old. Data from this report also revealed a growth of more than 10% in global social network users with 424 million new users starting to use social networks during the past year.

The scientific community has recognized social networks as a new way to communicate, collaborate and share information. As predicted by Nassi-Caló (2015), a significant increase in the use of social networks in scientific communication has been observed in recent years, with the creation of specific platforms for interaction and information exchange among researchers. Frias (2014) also emphasizes the importance of researchers being present in social networks because they have spread to various sectors and fields, allowing them to reach a larger number of people to disseminate their research.

Figure 2 below shows the presence of these academic networks on the main social platforms such as Facebook, YouTube and Instagram.

Figure 2

Number of users hosted by Mendeley, Academia.edu and ReseachGate in the six main social networks.



Note. Data obtained from official profiles, November 18, 2022.

In this sense, de la Piedra and Meana (2018) stated years ago that "social networks serve the purpose of reducing communicative limitations and you end up developing apparently close relationships with people who are not; a subjective impression" (p.453).

In parallel to this we must take into account the data collected through the latest survey of *Social Perception of Science and Technology in Spain* conducted by FECYT (2020) on the relationship between science, technology and society. As can be seen in Figure 3, 61.4% are informed about science and technology topics through the Internet (digital press, social networks and other websites) compared to 14.5% who do so through popular science or technical magazines. These data reaffirm the importance of scientific dissemination through these channels.

Figure 3

Responses for the Science and technology and media survey.

A CONTINUACIÓN VOY A LEERLE DISTINTOS MEDIOS DE COMUNICACIÓN. NOS GUSTARÍA SABER A TRAVÉS DE QUÉ MEDIOS SE INFORMA UD. SOBRE TEMAS DE CIENCIA Y TECNOLOGÍA (P.10.B1)
POR SEXO Y EDAD

	TOTAL	SEXO		EDAD					
		Hombre	Mujer	De 15 a 24 años	De 25 a 34 años	De 35 a 44 años	De 45 a 54 años	De 55 a 64 años	De 65 y más años
Internet (prensa digital, redes sociales y otras webs)	61,4%	62,9%	60,2%	79,6%	78,4%	77,9%	65,7%	53,6%	25,0%
Libros	15,8%	15,6%	15,9%	16,3%	18,5%	15,6%	15,4%	15,4%	14,4%
Prensa escrita en papel	34,4%	38,1%	31,2%	27,0%	26,9%	25,6%	31,9%	40,5%	50,0%
Radio	41,0%	44,3%	38,1%	30,6%	36,3%	38,3%	39,6%	44,2%	51,9%
Revistas de divulgación científica o técnica	14,5%	13,6%	15,3%	16,1%	16,6%	17,4%	14,0%	16,0%	8,8%
Revistas semanales de información general	13,1%	11,5%	14,4%	12,0%	13,0%	10,1%	13,4%	13,6%	15,9%
Televisión	72,0%	69,7%	74,0%	78,1%	68,2%	65,0%	76,1%	68,8%	76,3%
Otros	2,4%	1,7%	3,0%	2,8%	1,7%	2,5%	2,3%	1,0%	3,8%
Ninguno	1,9%	1,1%	2,5%	1,5%	0,2%	2,6%	2,6%	3,5%	0,5%
No sabe	2,2%	2,5%	2,1%	1,1%	2,1%	2,1%	2,7%	3,4%	1,8%

% Porcentajes más destacados en sentido horizontal
% Porcentajes menos destacados en sentido horizontal

Note: The results shown in the table answer the question: *Next, I am going to read you different media, we would like to know through which media you are informed about science and technology issues*. The Social Perception of Science and Technology in Spain report conducted by FECYT was prepared in 2019 and published in 2020. (p.160). Source: www.fecyt.es

Methodology

One of the main problems faced by science popularization is the lack of channels that help the understanding of scientific information that explains the reality around us (Vivas et al., 2017) and, especially, to a young audience. In this sense, this research aims to show the importance of exploring and applying new ways or channels of dissemination according to the current needs and demands, to reach a young audience in terms of popularization and scientific knowledge.

Based on the various primary data collection methods proposed by Torres et al. (2019) for the design of a survey in a scientific research proceeded to the development of a questionnaire to determine the importance of the application and use of social networks in science outreach aimed at young university students.

Following Torres et al. (2019), for the design of this survey, firstly, the object of the survey was defined, secondly, the questionnaire was formulated to obtain the data, and finally, the analysis was carried out.

It is, therefore, a descriptive method that offers the possibility of detecting needs, habits and other aspects that will give way to solid research (Torres et al., 2019, p.4).

The survey was conducted in person with a total of 188 undergraduate students at the Universidad Europea del Atlántico, located in Santander, Spain. A Google Forms form was used so that students could access via a QR code sent to their institutional email, which ensured the reliability of the responses and the thoroughness of the results. The data were collected guaranteeing the anonymity of the participants by answering 14 mandatory questions organized in two blocks. A first block with four questions referring to sex, age, degree and current academic year; and a second block of ten questions referring to consultation and contact with academic journals.

Once the correspondence between scientific dissemination and social networks has been contextualized in data and in a general way, the questions that make up the questionnaire are presented, which has been developed as an approach that allows us to know the situation of young university students in relation to scientific dissemination.

1. Sex:
    - ❑ Man
    - ❑ Woman
    - ❑ I prefer not to say
2. Age:
    - ❑ Between 18 and 20
    - ❑ Between 20 and 22
    - ❑ Between 22 and 25
    - ❑ More than 25
3. Grade Studied:
4. Course you are in:
5. Have you ever turned to scientific journals for information?
    - ❑ Yes
    - ❑ No

6. What is the main reason you come to your practice?
    - ❑ Academic subject
    - ❑ Interest
    - ❑ Other:
7. what is the main reason you come to your practice?

- ❑ None
- ❑ Between one and two
- ❑ Between three and four
- ❑ More than four

8. What is your opinion on science popularization?
9. Do you obtain scientific information on social networks?
    - ❑ Yes
    - ❑ No
10. which social network do you use the most?
    - ❑ Instagram
    - ❑ Facebook
    - ❑ Twitter
    - ❑ LinkedIn
    - ❑ Other:
11. Do you consider it necessary to popularize science in social networks?
    - ❑ Yes
    - ❑ No
12. What is your opinion on the dissemination channels of scientific journals?
13. What do you think is the main problem with scientific journals?
14. Do you think that popularizing science in social networks would increase the interest of the younger public?
    - ❑ Yes
    - ❑ No

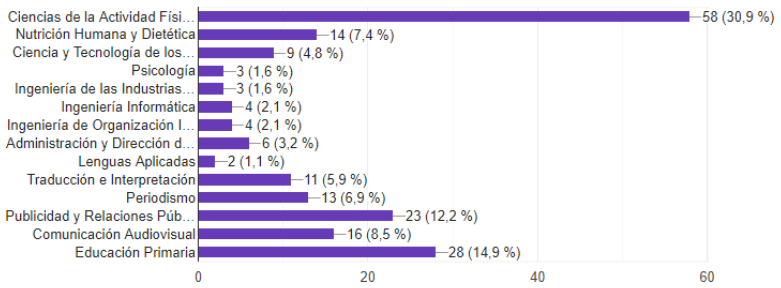
Results

The following are the participation results of the university students who completed the survey. This section is divided into two parts: the first part corresponds to questions that have been elaborated with the objective of knowing more in depth the characteristics of the sample, while the second part of the questions has been focused on knowing the perception of this public on the proposed topic.

Of the total 188 students, 54.3% were male, 42.6% were female and 3.7% preferred not to say. In terms of the age of the sample under study, the 20 to 22 age range is the highest (47.9%), in second place, the 18 to 20 age range (41.5%), followed by the 22 to 25 age range (11.7%) and in last place are those over 25 (3.2%). Another of the questions included referred to the degree that students at the European University of the Atlantic are currently pursuing. The results obtained, see **Figure 4**, reveal a high participation of students from the degree in Physical Activity and Sports Sciences (30.9%), followed by the degree in Primary Education (14.9%), Advertising and Public Relations (12.2%), Audiovisual Communication (8.5%), Human Nutrition and Dietetics (7.4%), Journalism (6.9%), Translation and Interpreting (5.9%), Food Science and Technology (4.8%), Business Administration and Management (3.2%), Computer Engineering (2.1%), Industrial Organization Engineering (2.1%), Psychology (1.6%), Agricultural and Food Industries Engineering (1.6%) and Applied Languages (1.1%). In relation to the year in which the students who completed the questionnaire were in, most of the participants were from higher years: fourth year (33%), third year (28.7%), second year (23.4%) and, lastly, first year students (16%).

Figure 4

Result of the grade level of the respondents.



Once this was raised, the second part of the questions focused on the students' appreciation of the proposed topic: the role of social networks in the scientific field. Therefore, in the questionnaire, reference was made to whether students have ever resorted to scientific journals to obtain information on a given topic. In this regard, 84% have done so, compared to 17.6% who have not. In this regard, the main reason for consultation by this group has also been ascertained. Bearing in mind that we are talking about undergraduate students, the main reason is for an academic matter (82.4%), followed by a matter of interest (22.3%) and, finally, 9.6% have resorted to this source for another reason.

The next question reveals striking data on the number of scientific journals students are familiar with. A 37.8% only know one, 29.8% two, followed by 17.6% for the option of three, 4.9% responded that four and more than four, 14.9%. Thus, it is possible to appreciate the existence of a certain lack of knowledge regarding this type of media on the part of young university students.

It has also been possible to know, through an open-ended question, the opinion of these students on science popularization as such. Despite the fact that this audience does not know many magazines of this type, of the 188 respondents, 155 have a good perception of science popularization, classifying it as: "necessary", "important", "useful" and contributes to learning.

However, 17 responses were collected referring to the "need to introduce a new point of view", to the claim of free content and to the need to promote it massively. "Their repercussion, they should do something to promote themselves more and reach more people", important considerations, since it is precisely on these last issues that the project is based. On the other hand, 16 people preferred not to answer due to lack of knowledge on the subject.

Bearing in mind that the development of this work is based on the importance of the application and use of social networks in scientific dissemination aimed at young university students, 71.3% acknowledged that they usually obtain scientific information through social networks, compared to 29.3% who did not.

As for the social networks most used by this *target*, Instagram is in the lead (68.1%), Twitter (12.2%), YouTube (10.1%), Facebook (4.8%), TikTok (1.6%) followed by Twitch, WhatsApp and LinkedIn (0.5%). Some data to take into account when developing the strategy for the dissemination of content on social networks for university audiences. Along the same lines, 96.3% believe that dissemination in social networks is necessary, compared to only 3.7% who do not.

On the other hand, with regard to the question *"What is your opinion about the dissemination channels of scientific journals?* It is noteworthy that despite its open-ended

nature, the answers are repeated. Thus, 19.14% believe that the dissemination channels of scientific journals face problems of advertising, *marketing* and promotion; for 17.55% this type of channels are boring and therefore are not attractive to the public; 14.89% consider that the main problem is the access and, in some cases, the price of these channels; 13.29% indicated that it is due to the technicality they use; and 10.63% referred to the fact that the public is very defined and a younger *target* is not taken into account. Some examples of these responses are shown below:

"I believe that the diversity of means of conveying information from this type of magazine

is necessary, I mean, the more means they have and the more modernized they are,

will get more attention.

- "It would take more variety and aimed at all types of audiences."
- "I think using social media could give them a plus to reach more people."
- "Nobody reads magazines anymore, practically. They need to renew themselves."
- "I think it should be given more visibility so that people know more about it."

The last question raises the possibility that science outreach on social networks may increase the interest of younger audiences. A total of 74.4% said yes, 27.7% said "probably" and 2.1% said "no".

Discussion

From the above it can be interpreted that, among the main problems to connect this relationship between students and scientific journals, are the lack of promotion, lack of knowledge and the scope of these.

Despite the push and the updates that some scientific journals carry out to broaden their audience, young university students are not particularly interested in this type of publications. For these reasons, it is worth asking for future lines of research whether more efforts should be unified between scientists, journals and university teaching staff to introduce students to this field. In addition, it would be appropriate to question whether the scientific dissemination also has to go through the registration of traditional social networks as do newspapers, companies, agencies, institutions or musical groups, and whether the fact of being on YouTube, Instagram or Facebook, guarantees an increase in traffic in reading and consultation of the articles and research published or whether it would simply serve as a tool to help position the journal in digital search engines.

Conclusions

Thanks to the data obtained, it has been possible to know aspects such as; the main reason for consultation by young people, their perception of scientific dissemination, the role of social networks and the way in which these could bring these contents to a younger audience. Thus, the results reveal the importance of the presence of scientific information in social networks, as well as the applications most used by the *target* in question.

The study highlights the importance of adapting scientific dissemination to the preferences of young university students, using social networks and attractive content. It also suggests the need to join efforts between scientists, journals and teaching staff to encourage students' interest in science outreach. It also raises questions about the

relevance of the presence in traditional social networks and their effect on the dissemination of scientific research

Likewise, young university students demand scientific publication in other languages, as they have made known in the form previously filled out, free and open access or specialized journals focused on a single subject. The different data and information from the study have shown the importance of being present in social networks, especially with regard to the younger audience, and other aspects to be taken into account such as simplicity of language and the use of graphic and audiovisual content. In short, if scientific journals were present in networks, used less technical language and responded to the demand for renewal, they would increase their readership and even attract a hitherto distant audience.

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