



What university students know about climate change and how they obtain information on the subject: the case of the University of the Basque Country (UPV/EHU)

Qué conocen y cómo se informan sobre el cambio climático los estudiantes universitarios: el caso de la Universidad del País Vasco (UPV/EHU)



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Abstract:

This paper analyses the level of knowledge among university students regarding climate change (hereafter CC), and the sources they use to stay up-to-date on the issue. A case study of the University of the Basque Country (UPV/EHU) was conducted using a structured survey based on a research

Resumen:

El presente trabajo analiza el grado de conocimiento y fuentes de información sobre el cambio climático (CC) del estudiantado universitario tomando como caso de estudio la UPV/EHU. Para ello se realizó una encuesta estructurada con una muestra de dicha universidad

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sample from this institution (n=465). The results indicate that the vast majority of the sample believe CC is real (92.4%). Moreover, they believe the main cause of the problems is human activity (87.4%), and that such change will result in serious negative consequences in the future (94.0%). Although the overall level of knowledge about the expected consequences of CC is high (8.25 out of 10), the feeling among students about being well-informed is only average, which seems to be a paradox. Furthermore, the envisioned negative consequences of CC do not lead participants to regularly seek information on the subject. When they do, the main source of information they mention is the Internet, followed by television. Websites on the Internet that stand out are social media, YouTube-style video sites, and traditional media, both generalist and specialised. Few differences have been found regarding gender, socio-economic class, or whether the students are studying humanities or science.

Keywords:

Climate change; information; communication; the Internet; university students.

1. Introduction

The Intergovernmental Panel on Climate Change (IPCC), created by the United Nations in 1988, consists of hundreds of researchers from 195 UN Member States, and for years it has been warning of the existence of climate change (CC), as well as its negative impact on the planet. As early as 2001, in its Third Assessment Report (IPCC, 2001), this panel provided extensive scientific evidence about this issue. In successive reports, IPCC experts have become increasingly strident in pointing out the global impact of climate change and the need for immediate action. In their most recent work, the Sixth Assessment Report, the IPCC experts made the following statement:

“People’s health, the lives and livelihoods of citizens, as well as property and essential infrastructures such as energy and transport systems are increasingly threatened by the danger of heat waves, storms, drought, and floods, as well as by slow-onset changes, one of which is rising sea levels” (UNEP, 2022).

As a result, an increasing number of scientists and institutional decision-makers are demanding immediate action and calling for social mobilisation. One example was given in a statement by António Guterres, Secretary-General of the United Nations, in this comment: “The UN is asking countries for more investment for the purpose of adapting their activity to this situation in order to save millions of lives from the devastation of climate carnage” (*El País*, 3-XI-2022).

Such urgent rhetoric, together with the expressions “climate crisis” and “climate emergency”, are receiving increasing coverage by the media (Parks, 2020). Therefore, this new terminology is being endorsed by sectors of the political and social domains, as well as by members of the scientific community (Tena, 2019, and Erviti-Ilundáin, 2020).

The growing concern over CC among the Spanish population is evident through several indicators, such as public opinion polls, the increased coverage of CC on the Internet and social media sites, and the heightened awareness of its impact on health. Given that the majority of Spanish citizens acknowledge CC as a real, negative phenomenon, this in itself indicates

(n=465). *Los resultados indican que la enorme mayoría cree que el CC es real (92,4%), que las principales causas son de origen humano (87,4%), y que traerá serias consecuencias negativas (94,0%). En general, el nivel de conocimiento sobre las consecuencias esperadas del CC es alto (8,25 sobre 10), pero paradójicamente la sensación de estar bien informados es media. Asimismo, esta identificación de las consecuencias negativas del CC no les lleva a informarse habitualmente sobre el tema. Cuando lo hacen, la fuente principal de información que citan es Internet, seguida de la televisión. Dentro de Internet, destacan las redes sociales, las páginas de videos tipo YouTube y los medios (generalistas o especializados). Existen pocas diferencias entre sexos, clases económicas percibidas, o si son estudiantes de letras o ciencias.*

Palabras clave:

Cambio climático; información; comunicación; internet; estudiantes universitarios.

widespread concern (García-Estañ López, 2022). Recent studies show a significant increase in CC-related internet searches in Spain due to heightened media coverage together with extreme weather events (Álvarez-García et al., 2023). A data analysis conducted by the social network X (formerly Twitter) points out that the emotional response to climate-related events has intensified since Covid-19, highlighting the urgency of the problem. There is also a strong negative feeling toward climate change, which is exacerbated by the rise in temperatures and more frequent heat waves (Loureiro & Alló, 2024). The projected increase in extreme weather poses significant risks to health and well-being, which is fueling public concern even more (Bento et al., 2024).

Climate change is a key issue for societies all over the world. Countries continue to demand more information, as verified by a study carried out regarding worldwide climate news coverage by Aoyagi et al. (2024). The results of the study are based on the analysis of 131 sources, including newspapers, radio, and television in 59 countries and seven distinct regions of the world. The Spanish population's commitment to CC has been linked to the frequency of news coverage and social movements that advocate taking action on climate change (Álvarez-García et al. 2023). The media play a crucial role in terms of information, dissemination, and awareness-raising, as they are capable of contributing to the fight against climate change by influencing production and consumption patterns (Fernández-Reyes & Rodrigo-Cano, 2019).

In this scenario, CC will affect younger people to a greater extent, as they are more likely to suffer its consequences throughout their lives. Several studies indicate that they may be especially vulnerable to mental health problems as well, which could be exacerbated by CC (Stevenson & Peterson, 2015 and Wu, Snell and Samji, 2020). Students' concern over climate change are increasingly prominent and reflect a combination of awareness, anxiety, and the desire for action. Specifically, university students play a crucial role in addressing CC, as their knowledge and perception significantly influence their involvement in environmental activism and sustainable practices and, at the end of the day, they are the ones who currently have, and will have in their professional lives in the future, the responsibility for making changes toward a sustainable society (Parker, Gumucio and Muñoz-Rau, 2012).

In short, research on the degree of knowledge and information that university students have about CC is relevant and is the main purpose of this research. Moreover, in addition to reviewing previous studies along the same lines in order to ascertain the state of the issue, a specific case study has been conducted involving students at the University of the Basque Country (UPV/EHU). This university has been chosen for its overall size, the amplitude of its faculties in terms of number of students, and for being a regional benchmark as well. Therefore, this institution may be useful for subsequent comparative analyses on the issue at both the national and international levels, for the following reasons: It has more than 45,000 students in three of its provinces, including Vizcaya, Álava and Guipúzcoa; it has a wide variety of faculties and schools with a multitude of disciplines; and finally, it is among the top 400 universities in the world, according to the Shanghai Ranking (Basque Government, n.d.; University of the Basque Country, 2023). Social and cultural factors also play a crucial role in shaping perceptions of CC, as they affect sustainable behaviour in diverse communities (Shtessel, 2023), which highlights the relevance of the case study at hand.

To carry out this research, a structured survey of a representative sample was used as the study methodology. This paper aims to answer the following research questions (RQ):

RQ-1: What is the extent of university students' knowledge of CC?

RQ-2: How do university students learn about CC?

RQ-3: What is the most common medium they use to stay informed about climate change, and what are its characteristics?

As a working hypothesis, it is assumed that university students at UPV/EHU have a high level of knowledge about CC, and that they obtain information on this issue through various media. Nevertheless, it appears that the Internet, and specifically social media, are their main sources of information.

2. Theoretical review and posing the issue

2.1. *Communicating climate change*

Climate change communication (hereafter CCC) is a crucial part of raising awareness and encouraging action to be taken on climate-related challenges. In this regard, effective communication is essential for narrowing the gap between scientific knowledge and public understanding. Techniques such as storytelling, visualisation, and targeted messaging can improve public engagement and awareness (Karacaoğlu & Akbaba, 2024).

The scientific literature on CCC highlights the need for context-specific strategies, especially in developing countries where socio-economic challenges are intertwined with climate issues.

Understanding local perspectives can serve as a basis for initiatives aimed at more effective communication. In any event, while the literature emphasises the importance of communication in taking action on CC, challenges remain, such as ensuring that heightened awareness results in significant changes in behaviour. Therefore, more research is needed to explore these dynamics and develop effective intervention (Amiyo, 2023).

The media play a pivotal role in shaping public perception and action directed toward CC, as they are largely responsible for the dissemination of scientific knowledge on climate change and its incorporation into everyday life (Olausson, 2011). Research indicates that exposure to CC information through traditional media significantly influences pro-environmental behaviour by increasing public concern (Vrselja et al., 2024).

While the media can increase the public's knowledge of CC, as well as their awareness of the issue and actions to be taken in fighting it, a number of challenges still remain. The media determine which occurrences become "news" by interpreting the causes and consequences of a given event according to their own ideological and political proclivities (Carvalho & Burgess, 2005). As a result, media coverage of this issue, especially due to the influence of political and/or ideological media agendas, is controversial, and many outlets have been criticised for not adequately covering the climate crisis, or for not doing enough to highlight its severity (Maran & Begotti, 2021). In this regard, information related to the climate crisis tends to emphasise its physical impact, by portraying vulnerable scenarios that should concern us, yet without offering solutions (García-Vinuesa et al., 2022). This *catastrophe bias* cultivates social pessimism and can inhibit effective responses (Heras, 2013). Likewise, the media often avoid the socio-economic factors that affect climate dynamics (Moreno & Almirón, 2021), and instead fuel cultural lifestyles and development patterns that comprise the root of the problem. Consequently, they shift the responsibility

for seeking and implementing solutions to governments and other decision-making authorities that are distant from the daily lives of citizens (Meira-Carrea, 2016). In this way, the “erroneous beliefs ingrained in students, and in the population at large, are amplified and spread, generating portrayals that produce confusion, social noise, and bewilderment” (García-Vinuesa et al., 2022, p. 29).

In turn, social media play a key role in CCC, as they influence public perception and commitment through various types of media. The integration of visual content such as infographics and memes enhances the effectiveness of climate-related messages, especially among younger audiences such as university students, and are therefore increasingly important for engaging audiences and conveying CC narratives more effectively. However, while these images transcend cultural boundaries, interpretations may vary according to diverse socio-cultural contexts (Schäfer & Yan, 2023). Social media discussions also reveal critical insights into public sentiment and policy implications and highlight the need for a coherent approach to CCC (Mandal et al. 2024).

While social networks enable CCC, they also present challenges such as disinformation and polarisation, which require careful management and strategic engagement (Pupneja et al., 2023). However, an analysis of social media conversations indicates that CC remains a dominant issue, and that discussions tend to be more pro-environmental and less polarised than previously thought (Dubey et al., 2024).

In Spain, several authors point to the year 2018 as a before and after for CCC in the media. Generally speaking, until that year there was a “long period in which the issue was irrelevant for the media” (Teso-Alonso & Lozano Ascencio, 2022, p. 66), with the exception of certain peaks of increased coverage, such as during the international launch in 2007 of the documentary, “An Inconvenient Truth”, led by Al Gore. The former vice president received the Nobel Peace Prize later that year, together with the IPCC and the United Nations International Conferences on Climate Change, or COPs. According to Heras, Meira and Benayas (2016), a “silence regarding the issue of climate” made CC invisible in the media in the two decades prior to that year.

However, from 2018-2019 onward, due to the latest IPCC report, discussion regarding the climate emergency erupted on the scene with increased coverage on the Spanish media agenda (Ervti-Ilundáin, 2020). In recent years, this tendency of the media to show increased interest in the climate crisis has occurred worldwide, with the Conference of the Parties (COP) being the moments of greatest attention, even including front page headlines on the subject (Rodrigo-Cano et al., 2021). In Spain, this upward trend in media interest in climate change has occurred in a similar way, with COP25 being its peak moment, which was held in Madrid in 2019 (Teso-Alonso & Lozano Ascencio, 2022).

Recent studies on CCC in Spain reveal a multifaceted scenario influenced by social media, corporate discourse, and public interest. These studies highlight the evolution of narratives and feelings surrounding CC, especially in the context of recent events. While such research highlights the growing awareness and engagement with CC in Spain, it also reveals a gap between intense participation and public understanding, as well as complex communication strategies, suggesting the need for a more comprehensive and stronger climate discourse to improve effective citizen understanding and action (Álvarez Rivas et al., 2024). An analysis of branded content in Spanish newspapers highlights the challenges readers face in distinguishing sponsored content from CC editorial pieces, which might be leading to confusion about the information presented (Jiménez-Gómez & Rodríguez, 2023). Internet queries regarding CC are growing in Spain because of increased media coverage along

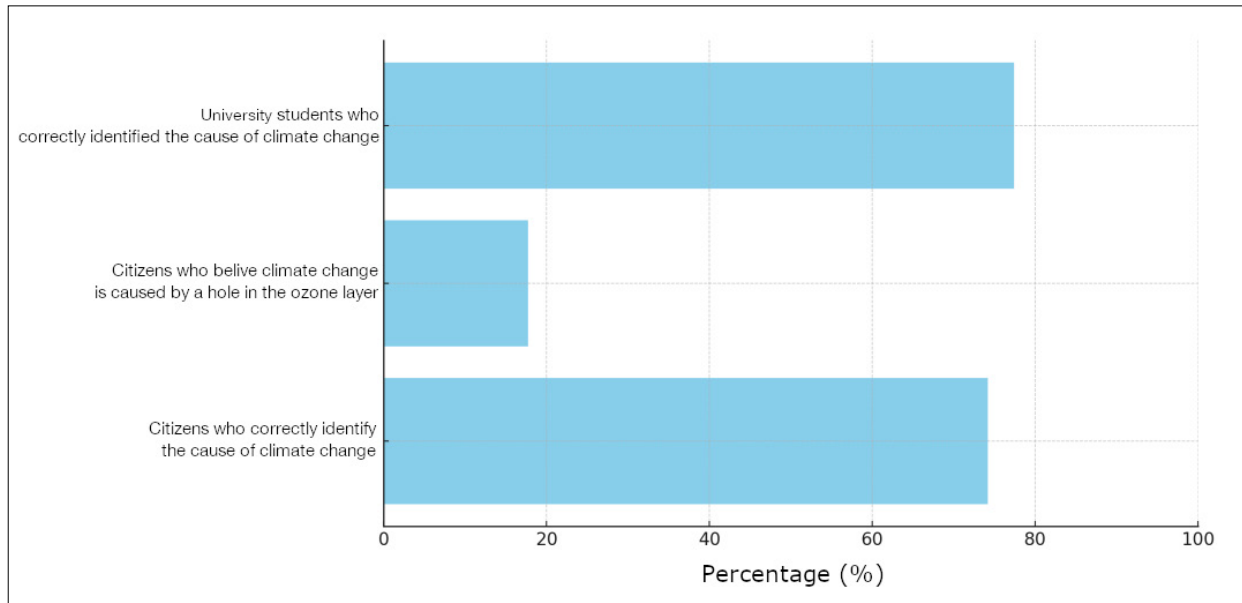
with extreme weather events, suggesting that not only social movements, but the media as well, play a crucial role in shaping public concern over this issue (Álvarez-García et al., 2023).

On the other hand, although academic research on CCC in Spain has been carried out for years, such studies have proliferated since 2010 with topics such as climate summits, volume of coverage, diverse editorial lines, the existence of negationism, and the link to the educational domain and business communication as well (Erviti-Ilundáin & León, 2017; Torres-Roma & García-Mirón, 2021; Teso Alonso & Lozano Ascencio, 2022). Since 2020, a new impetus has been given to this area of research, and the publication of articles in scientific journals has been accompanied by the issue of several books on CCC with the participation of leading experts in the field in Spain (Fernández-Reyes, Rodrigo-Cano, & Girardi, 2020; Rodrigo-Cano, Mancinas Chávez, & Fernández Rial, 2021; Álvarez Rivas et al., 2024). Furthermore, a report has been published by the Climate Change Communication Observatory on an annual basis since 2020, which is promoted by the research group known as Dialectical Mediation of Social Communication (*MDCS*) of Complutense University of Madrid (*UCM*), as well as the NGO known as *ECODES*. In these reports, analyses are carried out of the main conventional and online media in Spain with regard to their dissemination of information on the climate crisis (*ECODES*, 2024).

2.2. *Knowledge and information about CC among university students*

Diverse studies have analysed the way in which society, and specifically university students, stay informed about climate change, as well as their level of knowledge about the issue. At the international level, the Digital News Report 2024 (Newman, Fletcher et al., 2024) published by the Reuters Institute and the University of Oxford on media consumption by the world's population, highlights the fact that video has become the most important source of online news, especially among younger groups. This is especially true among young people between 18 and 24 years of age, which includes university students, who are increasingly using visual and video platforms such as TikTok, Instagram and YouTube to obtain information about CC. Specifically, 23% of this population access news about such content on TikTok on a weekly basis, with a notable increase in Africa, Asia, and Latin America. Another important finding of the report is that young people are increasingly influenced by content creators and influencers on platforms such as TikTok and YouTube, who often surpass traditional news brands in terms of relevance. This reflects a shift in news consumption, with users seeking more personal and accessible approaches, raising concerns about the reliability of information on these platforms, according to the study.

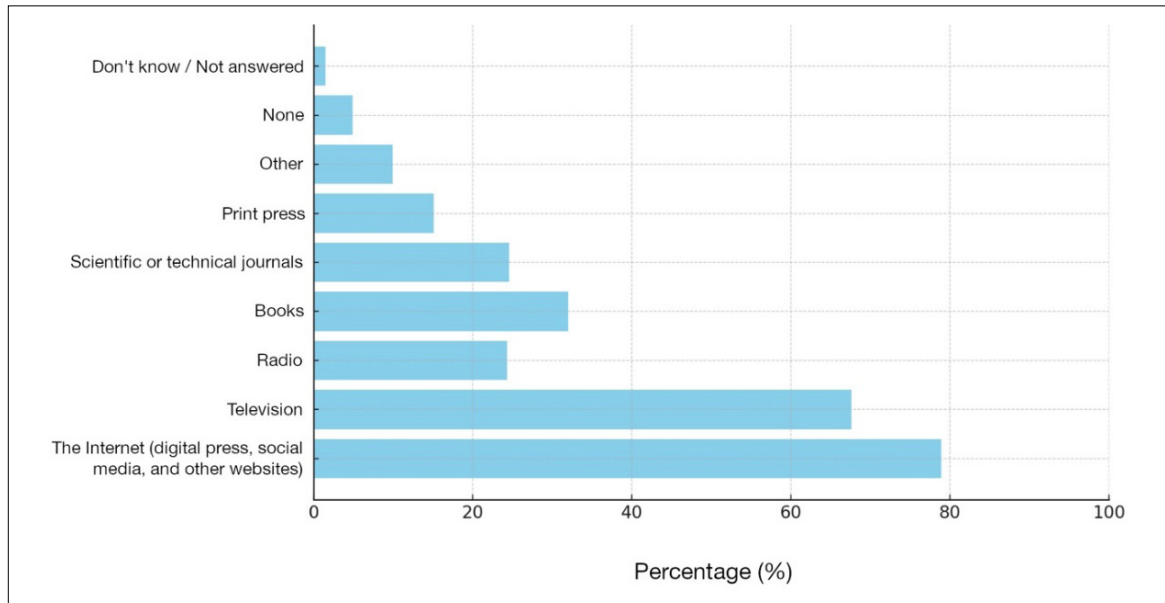
In Spain, the Spanish Foundation for Science and Technology [*FECYT*] published its Survey of Social Perception of Science and Technology 2022, which also focused on information regarding the environment, and specifically CC (*FECYT*, 2023). According to the study, nearly three out of four citizens (74.2%) have accurately identified the current CC crisis as mainly due to the accumulation of greenhouse gases, compared to 17.7% who believe it is a consequence of a hole in the ozone layer. Regarding university students, who are approximately from 15 to 24 years of age, 77.4% were correct in their assessment of this question.

Graph 1. Perception regarding the cause of climate change

Source: FECYT (2023)

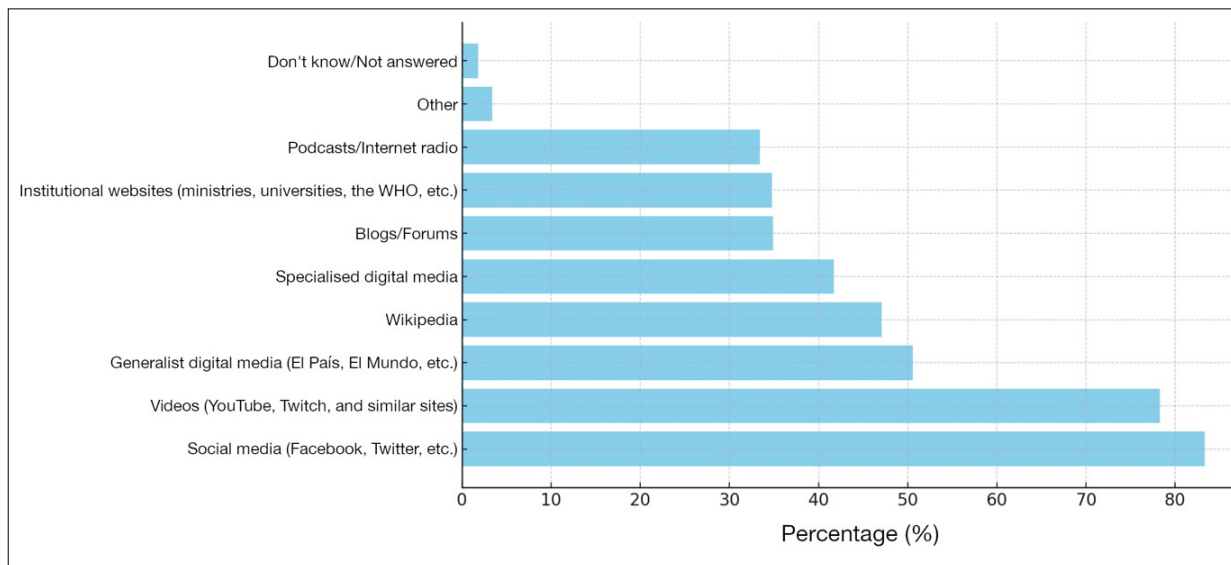
With regard to obtaining information about Science and Technology, which also includes information on CC, the Internet is the main source of information for the young people aged 15 to 24 who were surveyed in the FECYT study, which includes the digital press, social media, and other websites. The results are as follows: the Internet was used by 78.9% of the total, followed by Television (67.6%), Radio (24.3%), Books (32%), Scientific or Technical Journals (24.6%), the Print Press (15.1%), Other (9.9%), None (4.9%), and Don't know/Not answered (1.5%).

Graph 2. The media used by young people from 15-24 years of age to obtain information about Science and Technology



Source: FECYT (2023)

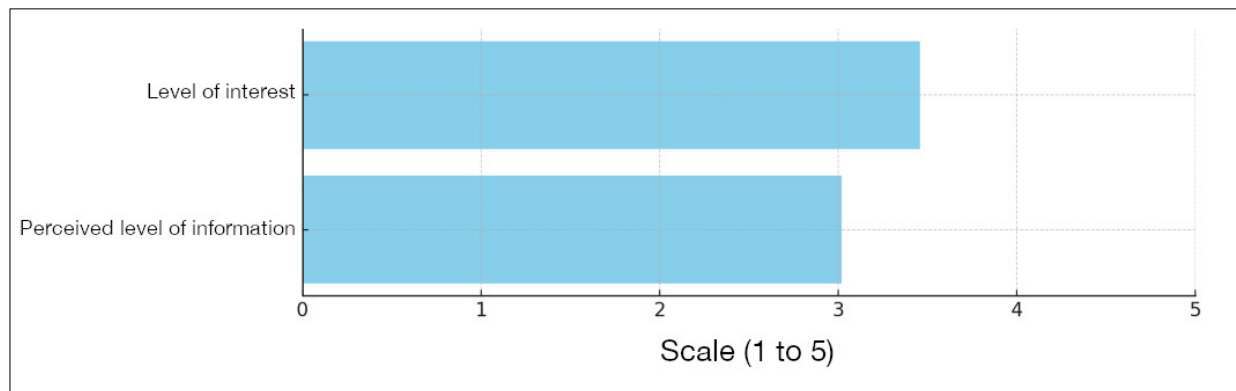
Specifically, the sites they use most on the Internet are Social Media (Facebook, Twitter, etc.), 83.3%; Videos (YouTube, Twitch, or similar pages), 78.3%; General digital media (*El País, El Mundo*, etc.), 50.6%; Wikipedia, 47.1%; Specialised digital media, 41.7%; Blogs/Forums, 34.9%; Institutional websites (ministries, universities, the WHO, etc.), 34.8%; Podcasts/ Internet radio, 33.4%; Other, 3.4%; Don't know/Not answered, 1.8%.

Graph 3. Internet use among 15-24-year-olds

Source: FECYT (2023)

Likewise, according to the FECYT survey, the level of information that young people aged 15 to 24 have about the environment and ecology, which includes CC, is below the level of interest they claim to have about the issue: While the perceived level of information is 3.02, with 5.0 being very informed and 1.0 having no information, the level of interest is 3.46.

Graph 4. Level of information among young people aged 15 to 24 on the environment and ecology



Source: FECYT (2023)

Several studies have addressed the issue of knowledge, information, and concern about CC among university students, and have concluded that although they have considerable knowledge about CC and are informed about the issue, they either have an apathetic view, or their feelings are not strong enough to generate behavioural changes. Moreover, these views could create a situation of climate anxiety, as well as a lowering of the perceived individual and collective ability to be self-effective¹ (Gonzalez and Maldonado, 2014; Velazquez et al, 2021; Maran and Begotti, 2021; Chelule et al. 2023; Wumaier, 2023).

2.3. *The impact of cultural and social contexts on the perception of climate change*

Although students express a high level of concern for socio-environmental issues, research indicates that their understanding of sustainability often remains somewhat limited, and their level of awareness and comprehension vary among different regions, cultural contexts, and social circumstances (de Rivas et al. 2024). Taking two opposing examples, a study conducted at an agricultural university in Ecuador revealed that 55.85% of the students had only an intermediate level of perception, and only 54.25% had actual knowledge of CC, suggesting the need to improve educational programs (Cornejo et al. 2024). On the other hand, a survey by the University of South Africa revealed that 97.9% of science students acknowledged the existence of CC, with 93.8% demonstrating an excellent understanding of its basic concepts (Chelule et al. 2023).

In Spain, university students report a desire for their universities to provide more climate-related information, as well as activities related to CC, which appears to connect information access to a higher level of activism (Almansa-Martínez et al. 2024). In this regard, Spanish universities have acknowledged the climate crisis and are actively participating in initiatives to raise awareness and promote sustainable practices within their communities (Ferrari et al., 2022). In the Basque Autonomous

¹ As noted by Maran and Begotti (2021), “Eco-anxiety”, or “Climate anxiety”, is associated with symptoms such as panic attacks, loss of appetite, irritability, weakness, and sleep disorders. Regarding “self-effectiveness”, this is the confidence in one’s own ability to achieve an intended outcome.

Region, a study involving 605 respondents revealed different attitudes toward environmental responsibility, indicating that social profiles influence ecological responsibility and perceptions of CC (Herranz-Pascual, 2024).

3. Sample and methodology used

The instrument of analysis used for this study was the structured questionnaire, conducted with a sample of students at the University of the Basque Country (UPV/EHU). The technique used was a survey with questions using a Likert-type scale. Specifically, the single-item scale validated by Van Valkengoed et al. (2021) was used to measure perceptions on climate change. To these five items, three more items were added to assess whether they consider themselves well informed, whether they know people who make sacrifices to combat climate change, and whether these respondents makes such sacrifices themselves.

On the other hand, previous studies were used to develop the 10-question (true/false) scale of knowledge about CC, mainly using Table 3 by Tobler et al. (2012) regarding knowledge of the consequences of CC, with the addition of a statement on skin cancer from an article by Fisher et al. (2019). In addition, once the questions had been drafted, two CC experts were asked for their opinion, after which changes were made to several of the statements in line with their suggestions. These experts included Jorge Olcina, director of the Climate Change Observatory of the University of Alicante, and Henrique Faria, researcher at the Basque Center for Climate Change (BC3), both of whom are internationally recognised climate researchers and IPCC reviewers. Regarding the two questions related to the sources used to learn about CC, several questionnaires from various studies and surveys were employed to develop the questions (FECYT, 2023; García-Vinuesa et al., 2022; Morote et al., 2021).

Moreover, certain demographic questions were also asked. The average age of the participants was 22.2 years (standard deviation was 6.7 years, and the median was 21 years); 43.9% declared themselves to be male; 53.8% said they were female; and 2.4% reported being non-binary. A total of 61% reported studying in a science faculty, such as science and technology, engineering, etc., while the rest claimed to be learning in a humanities faculty, including social and communication science, fine arts, etc. The figure of 29.8% considered themselves to be of the lower-middle class; 51.6% considered themselves to be in the middle class; and 9.6% stated being in the upper-middle class; 9.0% did not know or did not answer.

The survey was developed and managed using the Google Forms platform. As such, the participants only had to access a web link to complete the survey. Before it was sent out on a large scale, 15 students were assessed to check the general understanding and appropriateness of the questions. Some minor adaptations were made as a result. The questionnaire was sent through online means and the possibility of replying was offered between 10 October and 7 November 2022, inclusive, through the e-mail lists of the dean's offices of the following faculties and university schools of UPV/EHU, which reached all of their students: Science and Technology, Social and Communication Science, Engineering, Medicine and Nursing, Chemistry, Labour Relations and Social Work, Humanities, Fine Arts, and Education. The Science and Humanities faculties were selected due to their having the largest number of students. In this regard, the authors of the present study would like to thank the institutional heads of these faculties for offering the means to send out the questionnaires. After eliminating incomplete or incorrectly filled-in responses, such as giving the same responses in one block, a total of 465 valid responses were obtained from

the study sample. The sampling error, which can be attributed to a theoretical case in which a sample is strictly random, has been estimated at $\pm 4.52\%$, with a 95% confidence interval, assuming a universe of higher education students of approximately 40,000 people.

The analysis of the results was performed using IBM SPSS Statistics Version 28.

4. Results

4.1. University students' degree of understanding of climate change

As seen in Table 1, the respondents very clearly believe CC is real (92.7%), and that it will have very negative consequences in the future (94%). Although this certainty remains, it is slightly reduced when stating categorically that human activity is the cause of CC (87.4%), or assuming that the area in which they live will also be affected (83.6%).

Table 1. Perception of climate change

	Average	Deviation	Agree and Fully agree	Fully agree
I believe climate change is real	4.73	0.75	92.7%	81.8%
The main cause of climate change is human activity.	4.39	0.88	87.4%	54.9%
Climate change will have negative consequences	4.67	0.78	94.0%	76.5%
The place where I live will be affected by climate change	4.26	0.94	83.6%	47.8%
It will be a long time before the consequences of climate change are felt.	2.12	0.99	10.0%	2.5%
I believe I am well informed about climate change	3.18	0.91	38.8%	4.4%
In my surroundings, I know people who make sacrifices in order to reduce their impact on climate change.	3.30	1.08	48.2%	10.7%
In my daily life, I make conscious decisions to reduce my impact on climate change.	3.52	0.97	54.1%	13,4%

Source: prepared by the authors

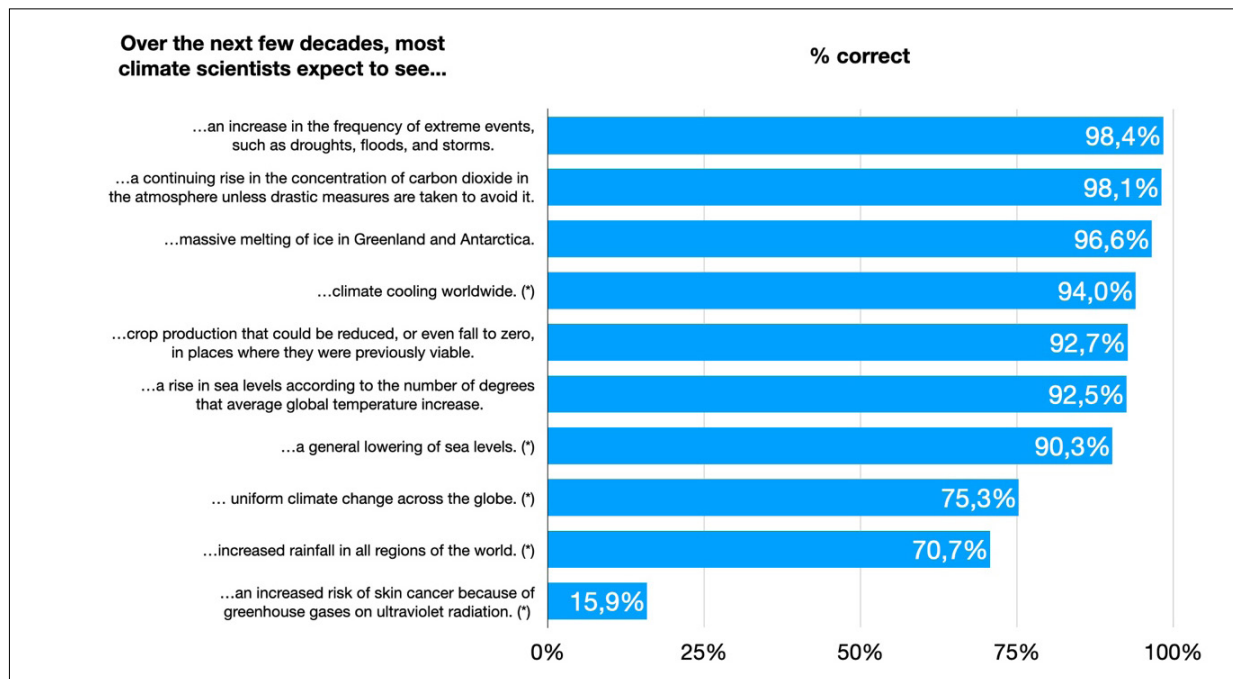
This conviction is reduced when asked whether they know people who make sacrifices to reduce their impact on CC (48.2%), or whether they do so themselves (54.1%). Furthermore, respondents do not agree that it will take a long time before the consequences of CC are felt (only 10.0% agree). Finally, we cannot say that most respondents consider themselves well informed about CC, with only 38.8% agreeing with this statement to some extent.

There are no significant differences between men and women: Women are slightly more likely to blame human activity for CC (4.46 vs. 4.26, $p=0.02$), slightly more certain that CC will have negative consequences (4.76 vs. 4.53, $p=0.03$), and somewhat more certain that the place where they live will be affected (4.35 vs. 4.14, $p=0.02$). On the other hand, men are slightly more likely to believe that it will be a long time before the consequences of CC are felt (2.28 vs. 2.00, $p=0.00$), and males consider themselves better informed than women (3.28 vs. 3.09, $p=0.03$). There are no significant differences between students from either humanities or science faculties.

Some differences have been found regarding socio-economic class, yet they are very small. Those who identify themselves as lower-middle class (4.44), or upper-middle class (4.41), agree more strongly that the area where they live will be affected by CC than the middle class (4.16, $p=0.01$). Those in the upper-middle class (3.57) had a higher perception of being well informed about CC than those who reported being in the lower-middle class (3.14), or middle class (3.19, $p=0.00$). Finally, a higher percentage of those in the upper-middle class (3.70) claim to know people in their environment who make sacrifices to reduce their impact on climate change compared to the percentage of those who refer to themselves as lower-middle class (3.39), or middle class (3.22, $p=0.01$).

Regarding the knowledge that young people display about CC, Graph 1 indicates that they have a generally high level, with an average of 8.25 out of 10, assuming a positive point for each correct answer with a deviation of 1.13, as seen in the following graph:

Graph 1. Knowledge about climate change (an asterisk [*] indicates a false statement)



Source: prepared by the authors

The statement with the lowest level of accuracy is the non-existent, and therefore false relationship, between CC and skin cancer. Two other statements with a below-average level of precision include the declaration that CC will occur uniformly across the globe (false, 75.3% answered correctly), and that precipitation will increase in all regions of the world (false, 70.7% gave a correct answer). As all three of these statements are false, one might believe that survey respondents have the tendency to answer affirmatively to everything they are asked. However, other false claims have been easily identified, such as the statement that the world's climate is going to get colder (94.0% answered correctly), and that the overall sea level will decrease (90.3% gave a correct answer). Therefore, these statements are somewhat controversial, yet in all cases they were answered correctly at least 70% of the time. With regard to gender, no significant differences were found between men and women, nor between students of science or humanities faculties, nor between individuals according to their stated socio-economic class.

4.2. How university students obtain information regarding climate change

Firstly, what stands out is that generally speaking, the frequency of consulting diverse sources of information regarding CC is low, as the highest average on a Likert scale of 5 responses between 1=Never and 5=Always is 3,58. Secondly, when examining the details, the Internet is the medium they consult most frequently for information on CC (56.4% do so often or always). Moreover, within the Internet (this second question was only answered by those who had declared using the Internet, and the results can be seen in Table 3), they make considerable use of social media (45.5%) and videos on YouTube-style platforms (34.4%), followed by generalist digital media (24.3%), media that specialise in science (24.8%), and podcasts and similar radio-format publications (19.5%).

After the Internet, television is the next most popular source of information on CC among young people (31.3%). Regarding the rest of the media, very low frequencies of consultation were reported, as seen in Table 2.

Table 2. Media used by young people to stay informed about climate change

(n=465)	Average	Standard deviation	Often and Always	Always
The Internet	3.58	0.99	56.4%	16.6%
Books	1.82	0.93	5.4%	1.0%
Print press	2.02	1.01	8.6%	0.6%
Radio	2.04	1.03	9.8%	0.8%
Science journals	2.28	1.10	9.7%	1.5%
Television	2.85	1.15	31.3%	5.7%
Other	2.09	1.18	12%	31%

Source: prepared by the authors

Table 3. Internet media used to obtain information about climate change

(n=350-360, depending on the specific item)	Average	Standard deviation	Often and Always	Always
Social media	3.57	1.13	45.5%	15.3%
Generalist digital media (<i>El País, El Mundo</i> , etc.)	2.93	1.10	24.3%	4.8%
Digital media that specialises in science and technology	2.84	1.21	24.8%	5.7%
Blogs/Forums	1.93	1.02	6.7%	0.6%
Podcasts/Internet Radio	2.45	1.23	19.5%	2.1%
Videos (YouTube or similar)	3.14	1.20	34.4%	7.8%
Wikipedia	2.09	1.08	10.0%	0.6%
Other	1.68	1.07	4.0%	1.7%

Source: prepared by the authors

Women consult television more frequently (3.04 vs. 2.58, $p=0.00$), social media (3.71 vs. 3.37, $p=0.00$), and the print press (2.12 vs. 1.88, $p=0.00$). On the other hand, men report a higher frequency of video consumption on the Internet (3.34 vs. 2.95, $p=0.00$), consulting specialised digital media (2.99 vs. 2.70, $p=0.02$), and using Wikipedia (2.28 vs. 1.93, $p=0.00$).

Humanities students more frequently consult television (3.02 vs. 2.76, $p=0.00$), social media (3.75 vs. 3.47, $p=0.02$), and generalist digital media (3.13 vs. 2.81, $p=0.00$). Conversely, science students are more likely to consult digital media that specialises in science and technology (2.96 vs. 2.65, $p=0.02$), video sites such as YouTube (3.28 vs. 2.90, $p=0.00$), and Wikipedia (2.18 vs. 1.94, $p=0.05$).

In terms of socio-economic status, printed science journals are more successful among those who identify themselves as being from the lower class (2.48) than among those who identify themselves as being in the middle (2.27) or upper-middle classes (1.86, $p=0.03$). The trend is similar in digital media that specialises in science (lower-middle class 3.03, average-middle class 2.84, upper-middle class 2.61, $p=0.02$). Podcasts and internet radio are more successful among those who identify with the upper-middle (2.64) or lower-middle classes (2.72), compared to those who see themselves as lower-middle class (2.33, $p=0.03$). Nevertheless, among all of these groups, the differences are minor.

The option Other obtained very low percentages in nearly all cases. The few who selected it mentioned friends, acquaintances, and relatives as “sources of information” in the open-ended responses. Another common response was linked to talks, conferences, exhibitions, and the like. Moreover, although there were some isolated cases that mentioned scientific articles, university courses, or the IPCC itself, which were associated with an interest in disseminating evidence regarding CC, there was no shortage of isolated responses with negationist content.

5. Discussion and conclusions

Before addressing the significance of these results, the limitations of the sample should be considered. As the survey was conducted in certain faculties of one university, the results cannot be extrapolated to the entire university population of the country, nor even to the autonomous region, which has two additional private universities. Nevertheless, we consider that the reasonable sample size ($n=465$) allows us to draw some exploratory conclusions.

In general terms, we assert that UPV/EHU students assume the following: CC is real; it is caused by human activity; it will have very negative consequences in the future (including in the region where they live); and it will not be long before its effects are felt. About half the respondents claim to know people who make sacrifices to reduce their climate footprint, or they make such sacrifices themselves. The level of knowledge regarding the basic scientific consensus on the effects of CC is quite high, although a large majority mistakenly associate CC with an increased risk of skin cancer. Delving into the reasons for this confusion could be a topic of future research. One hypothesis for this confusion is that the memory of the global problem of ozone depletion may have influenced the results, although most of the interviewees were not even born when the problem was at its peak in the media.

Contrary to what some authors have pointed out (Kahan et al., 2012), according to the results of the present study, it does not appear that scientific literacy, which is usually evaluated according to whether the respondents are studying in a faculty of science or humanities, has a significant effect on the perception of the phenomenon, nor even on the knowledge related to it. Another assumption regarding this point is that both science and liberal arts students might start from a satisfactory scientific background obtained in earlier stages of their education.

However, university students at UPV/EHU acknowledge that they do not frequently consult information sources related to CC. In this regard, several paradoxes emerge. On the one hand, there is dissonance between their high level of knowledge on climate change, on the one hand, and their perception that they are well informed about CC, on the other, as only 38.8% show a certain level of agreement with the latter. On the other hand, although they acknowledge the existence of a real problem that affects their lives and environment in a very negative way, the issue does not prompt them to stay regularly informed on the subject. Alternative appeals should be considered in public communication programmes that aim to raise awareness or increase the level of knowledge about climate change among this audience, as the discourse “about CC” does not seem to be an especially attractive subject for direct media consumption. This is especially true of awareness-raising activities that originate in and target the university itself.

In terms of which media are used by these students to obtain information about CC, the Internet stands out far above the others, followed at a great distance by television. Within the Internet, social media and videos are the main sources of information, followed by digital media, either specialised or generalist. Public campaigns for raising awareness and disseminating information regarding CC should consider these digital media when addressing the university community. Moreover, the university should consider any awareness-raising strategy as a priority based on these digital media.

Differences between women and men, or between people of various reported socio-economic categories are minimal, and the difference between science and humanities students is nearly non-existent.

Finally, this study paves the way for other similar research aimed at analysing the level of knowledge and information among university students in other autonomous regions, in order to discover whether regional differences exist with regard to levels of knowledge and sources of information used to stay informed.

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7. Specific contributions of each author

	Name and surname
Conception and design of the work	Sergio Monge Benito and Alex Fernández Muerza
Methodology	Sergio Monge Benito and Alex Fernández Muerza
Data collection and analysis	Sergio Monge Benito and Alex Fernández Muerza
Discussion and conclusions	Sergio Monge Benito and Alex Fernández Muerza
Drafting, formatting, version review and approval	Sergio Monge Benito and Alex Fernández Muerza

8. Conflict of interest

The authors declare that there is no conflict of interest contained in this article.

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