Revista Española de Pedagogía

Revista Española de Pedagogía (REP)
ISSN: 0034-9461
e-ISSN: 2174-0909

# The educational potential of the theory of social representations applied to climate change: A critical literature review

## *El potencial educativo de la teoría de las representaciones sociales aplicada al cambio climático: una revisión crítica de la literatura*

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**Abstract:**

The theory of social representations provides a theoretical framework for comprehending how information about climate change is transformed as it moves from the scientific realm and becomes intertwined with people's everyday lives. It also explores the relationship between this knowledge and the shared values, beliefs, and ideas within a specific social group. This article critically reviews 67 papers on social representations of climate change in diverse settings, identifying and analysing their main contributions, the methodological approaches used, and future research opportunities. This review offers a broad vision of the wealth of knowledge provided by the theory of social representations to understand climate change from a socio-educational perspective.

**Keywords:** social representations, social psychology, climate crisis, education, media, social action.

**Resumen:**

La teoría de las representaciones sociales ofrece una aproximación teórica que permite entender cómo se reelabora el conocimiento sobre el cambio climático al salir de la esfera científica e insertarse en la cotidianidad de las personas. Así, muestra cómo se articula con los

Date of receipt of the original: 2024-06-11.
Date of approval: 2024-09-06.
Please, cite this article as follows: Takano-Rojas, H., Castillo, A., & Meira-Cartea, P. (2025). The educational potential of the theory of social representations applied to climate change: A critical literature review [El potencial educativo de la teoría de las representaciones sociales aplicada al cambio climático: una revisión crítica de la literatura]. *Revista Española de Pedagogía*, *83*(290), 27-61. https://doi.org/10.22550/2174-0909.4097

valores, las creencias y las ideas compartidas por un grupo social en un contexto particular. El presente documento ofrece una revisión crítica de 67 artículos sobre representaciones sociales del cambio climático en diferentes contextos. Se identifican y analizan las principales contribuciones de los artículos, las estrategias metodológicas utilizadas y las oportunidades que abren para futuras líneas de investigación. La revisión brinda un panorama amplio de la riqueza que ofrece la teoría de las representaciones sociales para entender el cambio climático desde una perspectiva socioeducativa.

**Palabras clave:** representaciones sociales, psicología social, crisis climática, educación, medios de comunicación, acción social.

## 1. Introduction

Earth system science has alerted us to the threat posed by climate change (CC), to the consequences if the current rate of greenhouse gas emissions remains steady (Pörtner et al., 2023) and to the dangers that this could have for human society, the habitability of the planet and the continuity of life here (Rockström et al., 2023). This potential threat makes CC a priority social problem. CC, and socio-environmental crises in general, are phenomena that have revealed the shortcomings of the predominant economic model (Pelling et al., 2012), as production and consumption patterns driven by a globalised aspiration for a Western lifestyle have prompted the plundering of the resources on which life depends and are generating a systemic alteration of the biogeochemical cycles needed to maintain the ecological functioning of the planet (Batel et al., 2016; Pelling et al., 2012). These imbalances further widen the gaps of inequity and social injustice generated by the capitalist economic model (Schipper et al., 2020), inevitably necessitating a change of paradigm that enables us to transform our relationship with the environment and with other people, promoting a transition toward more just and sustainable kinds of societies (González-Gaudiano, 2012).

This transition requires profound cultural changes in our way of being and existing in the world. The complexity of CC forces us to question implicit assumptions about the global market economy. It requires a reassessment of the political and social mechanisms for solving a global problem with locally diverse consequences, demands that ecological and social problems be considered as interrelated, and calls for us to bear in mind cultural and psychological aspects related to cognition and public appreciation of the problem in order to encourage individual and collective action (Dryzek et al., 2011; Jamieson, 2012). In this regard, the contributions of social science are crucial for understanding the factors that facilitate or block individual, collective and institutional responses to CC (Norgaard, 2011; Poma, 2018). Aiding in the articulation of educational responses that are consistent with the potential threat of the climate crisis is particularly important. In other words, such responses should be proportionate to the magnitude and urgency of the social changes required to avoid the worst future scenarios and to adapt the different human societies to the impacts rendered inevitable by the inertia inherent to the climate system.

The theory of social representations (TSR), originally proposed by the psychologist Serge Moscovici in 1961, offers a theoretical framework for understanding how people give meaning to socially relevant objects, particularly those that are new to them, which generate social controversy or in some way represent a break from prior knowledge, such as those emerging from the scientific realm (Howarth, 2006; Höijer, 2011). Thus, the TSR can be a useful theoretical proposal for studying how CC is understood and the social response to it, and also for guiding educational actions aimed at intervening in the processes of reflection, cultural appropriation and social reaction.

### 1.1. Theory of social representations

The TSR is based on the premise that people in contemporary society construct their knowledge of the world from the information spread through the media, in their schooling and in individual and collective experiences. This information is interpreted according to a group's shared ideas, beliefs and values, guiding their practices, behaviour, language and interactions and affecting the way in which they cope with daily life (Moscovici, 2008; Jodelet, 1986; Flick et al., 2015). These systems of values, ideas and practices are called *social representations* (SR), and they function as filters for the discovery, interpretation and organisation of what we understand as reality (Höijer, 2011).

The TSR states that representations consist of three dimensions: information, representation and attitude. The *information* dimension refers to the knowledge that a certain group has of the object represented (Banchs, 2000).

The *representation* dimension refers to the elements involved in the representation, categorisation thereof and the way in which these elements interact to afford meaning to the object (Terrón, 2010). According to Abric (1996), these elements are arranged into a central core, containing elements not subject to negotiation, and peripheral elements, where variable elements are found that make the representation flexible in certain situations (Moliner and Abric, 2015; Wachelke, 2011).

Finally, *attitude* refers to the favourable or unfavourable approach that the subjects take toward the representation object (Jodelet, 2008). According to Moscovici, attitude is the first dimension that appears at the origin of a representation. This means that, even if the subjects have not acquired in-depth knowledge about an object or arranged its contents, there may be a general attitude with regard to that object, which is influenced by the shared ideas and values in the group to which they belong (Moscovici, 2008).

SRs are formed through two complementary processes: anchoring and objectification. In *anchoring*, certain elements of the object are compared and related to previously formed, culturally familiar representations, which facilitate interpretation of the object (Abric, 1996; Höijer, 2011; Jodelet, 1986). Through this categorisation, it is possible to *make the unfamiliar familiar*. Through *objectification*, in turn, an abstract idea is converted into a concrete concept through the materialisation of images, concepts or people that are associated with the representation object and make it tangible (Jodelet, 1986; Höijer, 2011). These processes become clear in language through the use of metaphors, associations or analogies used by individuals in their discourse.

SRs are classified as hegemonic, emancipated or polemic, depending on the consensus that exists about them. *Hegemonic* representations are those that feature a high degree of social consensus and are therefore coercive and influence the practices of a large group of people (Gillespie, 2008). *Emancipated* representations share features of hegemonic representations, but also have certain distinctive elements related to the values and practices of the groups that share them (Ben-Asher, 2003). In turn, *polemic* representations contradict hegemonic representations, thus giving rise to conflict (Ben-Asher, 2003; Gillespie, 2008).

The aim of this paper is to conduct a critical review of the literature published on social representations of CC (SRCC) and to identify the findings of this research, its methodological approaches and the future lines of research and action identified. This is done primarily for the purpose of identifying contributions to the socio-educational field.

## 2. Methodology

A search was conducted of articles about social representations of CC published in the *Scopus* and *Web of Science* databases for papers in English, and in *Dialnet, Redalyc* and *Scielo* for contributions in Spanish.

The search took place from 13 February to 10 March 2023, using the following terms: "*cambio climático*/climate change" or "clima/climate" and "*representaciones sociales*/social representations" or "*teoría de las representaciones sociales*/social representations theory" throughout the document. In a preliminary review, the duplicates found in the search engines were eliminated and the following inclusion and exclusion criteria were applied:

1. Research articles, review articles and book chapters that discussed the study of SRCC were included.
2. Documents with a corpus written in the English or Spanish language were included.
3. Documents published between 1961 (when Moscovici proposed his theory of social representations) and January 2023 were included.
4. In addition to documents about SRCC, documents about SR of related objects explicitly linked to climate change in the body of the text were included (e.g., social representations of adaptation and mitigation strategies, sustainability, meat consumption, fracking, geoengineering and energy).
5. Documents with themes that are not related to climate and/or CC, and those that do not explicitly mention the TSR were excluded (e.g., those that use the term representations in a broader sense, without referring to the TSR).
6. Whole books were not included because, given their length, they could not be analysed as closely as the other documents examined.

After applying these criteria, a total of 67 documents was obtained. In each document, the research aims, data collection techniques and analysis methods used were identified. At the same time, the bibliometric information was systematised (year of publication, country or countries where the research took place, type of document, title, authors' keywords), which can be found in the Appendix.

Taking an interpretative approach (Cantrell, 1996) and following the methodological recommendations of Varguillas (2006), a thorough content analysis of each document was conducted using the Atlas.ti software (version 8). To analyse the results retrieved, analysis categories were generated using the TSR as the basis, thus identifying the SRCC contents and distinguishing their dimensions (information, representation and attitude), processes (anchoring and objectification), structure (core and peripheral) and representation types (hegemonic, emancipated or polemic). The first author was responsible for constructing the categories and analysing the documents. Subsequently, the other authors reviewed the relationships between categories and offered suggestions for interpreting and explaining the relationships. An example of how the coding was done is shown in Table 1.

In the first example in Table 1, the *dimension_representation* code makes it possible to identify that the result reported refers to a content of the representation of climate change. In turn, the *anchoring_pollution* and *structure_core* codes indicate that an anchoring process in which climate change is linked to pollution is identified in the unit of analysis and that, because of its prevalence, this relationship is identified as part of the core of the representation. Likewise, in the second example, the *objectification_seasons, objectification_weather*, and *objectification_experiences* codes indicate that the excerpt reports objectification processes in which people give meaning to climate change based on their direct, observable experience of changes in seasons and in weather conditions.

Through a detailed reading of the documents and use of the Atlas.ti tools (Varguillas, 2006), shared and variable elements of SRCC were recognised, as well as the existence of key recurring themes around which the research revolves. These latter were taken as the basis for organising the results of the review.

Table 1. Example of the coding process in Atlas.ti

| Ref. | Unit of analysis | Category | Code |
|---|---|---|---|
| [28, p. 15] | The representation core among the students from both universities was pollution, which was the word that the subjects evoked first most frequently. | Dimension Processes Structure | dimensión_ representación anclaje_contaminación estructura_núcleo |
| [54, p. 289] | Experiences of changing seasons and curious weather give evidence of a presently changing climate. | Dimension Processes | dimensión_ representación objetivación_estado del tiempo objetivación_ estaciones objetivación_ experiencias |

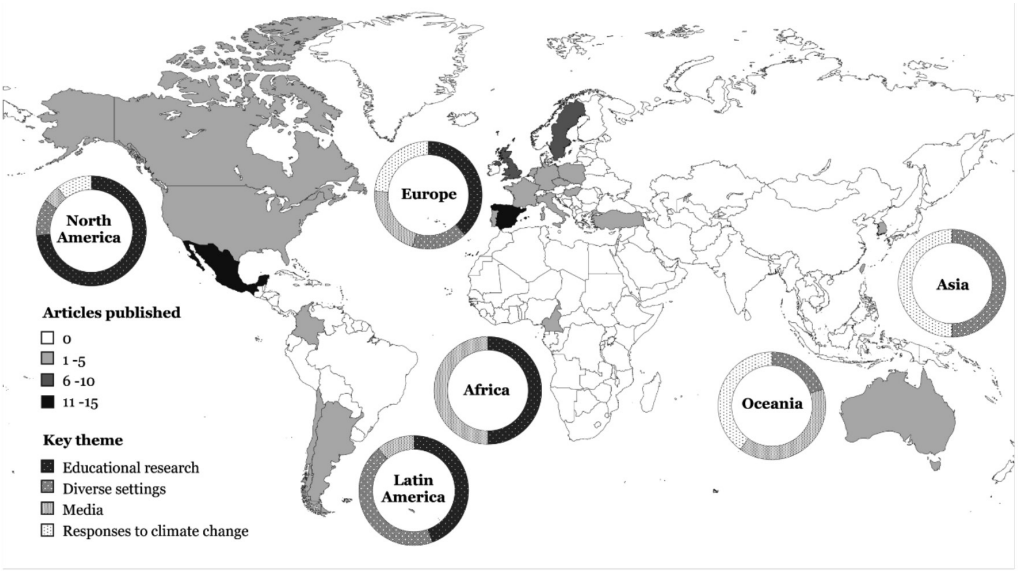
Note: two examples of the coding done in Atlas.ti are shown. The reference (Ref.) refers to the list in the Appendiz and the page from which the quote was taken.

## 3. Results

Five key themes were identified in the analysis of the documents (Figure 1). The research trends and geographic distribution are shown below, followed by the findings arranged as follows: sections *3.1. Use of the TSR in CC research* and *3.2 SRCC*: *shared elements* discuss the first key theme. They describe the theory's potential for CC research, its methodological approaches and the SRCC contents identified in the coding that appear repeatedly in the documents analysed. The second key theme relates to findings in the field of educational research, which are outlined in section *3.3. SRCC in educational research*. Section *3.4. The importance of context in SRCC* highlights those contextual elements that are crucial in the formation of SRCC. These findings mainly stem from research that compares the representations of social groups in a single setting or in diverse settings. Another key theme revolves around SRCC in the conventional media, whether print or audio-visual. These findings are shown in section *3.5. SRCC in the media*, which includes research on SRs of science and climate scientists in the media and the implications thereof for SRCC among the general public. Finally, section *3.6. SRs of responses to CC* discusses the final key theme, which deals with research on the SRs of certain adaptation or mitigation strategies implemented in diverse settings.

The map in Figure 1 shows that Europe and North America are the regions in which the most research has been done and the greatest variety of key themes exists. It is worth highlighting that a large percentage of this research is from Spain and Mexico, respectively, where projects in the field of educational research are prevalent. In Asia and Africa, on the other hand, the lowest number of projects is seen regionally, and several key themes have not yet been explored. Research projects were found in just four countries in Latin America (Argentina, Brazil, Chile and Colombia), and the key theme of responses to climate change was missing. In turn, Australia is the only country in the Oceania region where research on SRCC was reported. However, no papers addressing the theme of educational research were found.

FIGURE 1. Regional research trends in social representations of climate change.




| Key theme | References [Article ID] |
|---|---|
| General reviews | [1-3] |
| Educational research | [4-29] |
| Diverse settings | [30-44] |
| Media | [45-56] |
| Responses to climate change | [57-67] |

Note: the grey scale represents the number of research papers reported in each country. This differs from the number of documents analysed ($n$ = 67) because there are some trans-regional research projects that report results for more than one country. The graphs indicate the relative frequency of documents in each key theme per region, excluding general reviews. Below the graph, the total number of documents in each key theme and the references (the article ID in the list in the Appendix, where the bibliometric information of each document can also be found) are indicated.

## 3.1. Use of the TSR in CC research

The articles reviewed seek two primary objectives (Table 2): to understand the SRCC (contents or processes) in one or more social groups, and to recognise the role of mediators (curriculum, the media, etc.) in spreading the SRCC and how the climate science they spread is received and reinterpreted by diverse audiences. Some research has focused on the study of the SRs implicit in different adaptation and mitigation responses, while other projects offer surveys of diverse aspects of the SRCC.

Quantitative, qualitative and mixed research techniques (Table 3) have been used to study the SRCC. The quantitative techniques include statistical testing to identify trends in numerical data based on word lists, surveys, interviews or text analysis. These methods have proven useful in identifying generalisable contents of SR, recurring themes and associations, and, particularly, in distinguishing core and peripheral elements of the representations. They also make it possible to compare and contrast the SRCC between groups.

Prevalent among the qualitative techniques is the use of semi-structured interviews and focus groups (Table 3). The first of these enables the participants to elaborate on their

responses, making it possible to identify nuances, links and relationships between SRCC elements or dimensions, which may not be evident in quantitative approaches. Focus groups allow researchers to observe exchanges and the negotiation of ideas and to identify shared and contrasting elements in reasoning. Free word association has also been used to reveal contents of the representation and organisation thereof, in addition to the creation of graphs, drawings and accounts of experiences (Table 3), which enable participants to express themselves freely and to establish relationships between the representation elements and their daily lives.

Table 2. Objectives sought in the research of the articles analysed.

| **Objective** | **RF** | **References [Article ID]** |
|---|---|---|
| Identifying elements and/or processes of SRCC in a study group (*n* = 31) | 0.30 | [4, 5, 7, 8, 9, 10, 11, 12, 13, 17, 18, 20, 23, 24, 25, 27, 29, 30, 31, 32, 34, 35, 36, 38, 39, 41, 42, 44, 47, 48, 62] |
| Understanding the role of the media in spreading SRCC or SR of topics related to CC (*n* = 17) | 0.16 | [18, 24, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 56, 58, 61, 64, 65] |
| Comparing the SRs of two or more study groups (*n* = 16) | 0.15 | [4, 5, 6, 7, 14, 15, 18, 23, 28, 31, 33, 34, 39, 45, 46, 57] |
| Understanding the SR of responses to CC adaptation or mitigation or SR of topics related to CC (*n* = 16) | 0.15 | [29, 42, 43, 59, 55, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67] |
| Discerning whether SRCC affect the social practices of the study group (*n* = 8) | 0.08 | [26, 27, 30, 35, 36, 37, 62, 63] |
| Literature reviews about diverse aspects of SRCC (*n* = 6) | 0.06 | [1, 2, 3, 16, 19, 40] |
| Assessing the relationship between the climate literacy rate and the SRCC (*n* = 5) | 0.05 | [4, 13, 14, 17, 23] |
| Identifying emotions in SRCC (*n* = 2) | 0.02 | [48, 10] |
| Others (*n* = 3) | 0.03 | [15, 22, 21] |

Note: the article ID matches those in the list in the Appendix. The relative frequency (RF) of each objective is indicated.

Table 3. Methodologies used in the research of the articles analysed.

| | Methodology | RF | References [Article ID] |
|---|---|---|---|
| Data collection | Survey (*n* = 28) | 0.36 | [4, 5, 6, 7, 8, 9, 13, 14, 15, 17, 18, 20, 23, 24, 25, 26, 30, 34, 35, 36, 37, 38, 42, 43, 56, 62, 63] |
| | Interview (*n* = 15) | 0.19 | [5, 8, 9, 10, 32, 33, 34, 37, 38, 41, 46, 55, 57, 58, 59] |
| | Bibliographic/press/audio-visual media collection (*n* = 12) | 0.15 | [45, 47, 48, 49, 50, 51, 52, 53, 60, 61, 64, 65] |
| | Focus group (*n* = 8) | 0.10 | [21, 22, 29, 33, 34, 44, 54, 67] |
| | Free word association (*n* = 7) | 0.09 | [11, 12, 27, 28, 31, 39, 62] |
| | Others (e. g., accounts, drawings) (*n* = 7) | 0.09 | [5, 8, 9, 11, 12, 16, 40] |
| Data analysis | Statistical significance tests (descriptive, inferential, statistical testing) (*n* = 27) | 0.29 | [4, 6, 7, 9, 13, 14, 15, 17, 18, 20, 23, 24, 26, 28, 30, 31, 35, 36, 37, 38, 39, 41, 42, 43, 60, 62, 63] |
| | Discourse analysis (*n* = 22) | 0.27 | [8, 9, 11, 12, 5, 21, 27, 31, 33, 40, 41, 44, 46, 47, 48, 49, 54, 55, 58, 59, 64, 65] |
| | Content analysis (*n* = 17) | 0.19 | [4, 5, 11, 10, 22, 23, 26, 29, 31, 32, 34, 37, 40, 46, 53, 58, 67] |
| | Others (e. g., bibliometric analysis, social media analysis, semiotic analysis, thematic analysis, ALCESTE method) (*n* = 12) | 0.25 | [1, 3, 25, 40, 45, 50, 51, 52, 56, 60, 61, 67] |

Note: the data collection techniques and analysis tools reported by the authors are shown. The article ID matches the numbering in the Appendix. The relative frequency (RF) of each tool is indicated.

Regarding the use of the TSR in CC research, articles by González (2012), Jaspal et al. (2014) and Batel et al. (2016) offer enlightening reviews and reflections. They stress that the TSR owes its acceptance among the wide-ranging trans-disciplinary community of researchers to its social and cultural recognition in the construction of meanings, exceeding the limitations of individualistic perspectives that lead to reductionism (Batel et al., 2016). It also acknowledges that this construction is context-dependent and places the subject as an agent capable of influencing while also influenced by the socio-cultural setting (González, 2012; Jaspal et al., 2014). Another valuable feature of the TSR is that it recognises the functionality of common-sense knowledge, which is constructed on and responds to needs that differ from those of scientific knowledge, but which must not be underestimated or simplified as a distortion of the latter (Jaspal et al., 2014). For CC research in particular, the TSR offers an ideal framework because it was proposed for the purpose of understanding how objects emerging from the scientific realm are reinterpreted, resignified and grasped socially when they spread into the public sphere.

### 3.2. The SRCC: shared elements

In the analysis of these 67 documents, the uniformity in the SRCC of the groups studied, regardless of their social or cultural context (Table 4), is striking. This finding points to a strong degree of generalisation of the SRs of this object. The core contents of the representations consist of elements related to the causes and consequences of CC, focusing mainly on biophysical aspects, with few references to the social dimension. Except for the groups of denialists, who share a polemic representation of CC, most of the social groups studied share a hegemonic representation that acknowledges the existence of CC and its anthropogenic causality. However, that does not necessarily imply an understanding of the complexity of the matter or a meaningful connection to the dominant production-consumption model.

Table 4. Frequently reported SRCC contents.

| | Representation | | |
|---|---|---|---|
| | **Code** | **RF** | **References [Article ID]** |
| **Causes and consequences** | The anthropogenic origin of CC is acknowledged (*n* = 22) | 0.19 | [4, 5, 6, 9, 11, 12, 13,14, 17, 20, 21, 23, 25, 30, 33, 35, 36, 38, 40, 47, 50, 60] |
| | The economic model is mentioned as a cause of CC (*n* = 7) | 0.06 | [5, 20, 21, 29, 37, 54, 67] |
| | Biophysical consequences of CC are mentioned (e. g., cold/heat, melting, increase in sea level) (*n* = 27) | 0.23 | [5, 6, 7, 9, 11, 12, 18, 20, 22, 23, 25, 28, 34, 42, 47, 30, 33, 37, 38, 39, 40, 44, 48, 52, 53, 54, 62] |
| | Social consequences of CC are mentioned (e. g., diseases, famine, weak harvests) (*n* = 8) | 0.07 | [7, 9, 20, 22, 38, 40, 42, 50] |
| | CC is linked to other environmental problems (e. g., deforestation, urban development, water and/or resource shortages) (*n* = 10) | 0.08 | [2, 4, 5, 7, 11, 19, 20, 25, 30, 37] |
| | CC is linked to pollution (*n* = 17) | 0.14 | [4, 5, 9, 11, 12, 18, 20, 21, 23, 28, 30, 33, 37, 38, 39, 40, 59] |
| | CC is acknowledged as an aggravating factor of social and environmental problems (*n* = 7) | 0.06 | [4, 9, 11, 20, 38, 41, 42] |
| | CC is considered geographically remote (*n* = 14) | 0.12 | [5, 7, 9, 14, 17, 18, 21, 28, 38, 40, 44, 49, 50, 53] |
| | CC is considered remote in time (*n* = 6) | 0.05 | [5, 14, 18, 19, 21, 40] |

| | | | |
|---|---|---|---|
| **Erroneous notions** | The hole in the ozone layer is mentioned as a causal agent of CC (*n* = 16) | 0.61 | [5, 11, 12, 13, 14, 18, 20, 23, 25, 28, 33, 38, 39, 40, 49, 50] |
| | Indiscriminate use of the terms *climate* and *weather* (*n* = 6) | 0.23 | [4, 5, 7, 19, 40, 49] |
| | Others (e. g., CC is linked to skin cancer, acid rain, earthquakes) (*n* = 4) | 0.15 | [5, 7, 18, 38] |
| **Response** | The mention of response measures is absent or limited (*n* = 8) | 0.13 | [5, 7, 18, 23, 25, 29, 37, 39] |
| | Individual response actions are mentioned (*n* = 14) | 0.23 | [2, 5, 12, 19, 20, 21, 25, 28, 29, 36, 41, 44, 48, 59] |
| | Collective response actions are mentioned (*n* = 4) | 0.07 | [22, 29, 34, 50] |
| | One's own responsibility to act is mentioned (*n* = 3) | 0.05 | [4, 38, 54] |
| | The responsibility to act is deferred to others (e. g., industry, government, developed countries) (*n* = 14) | 0.23 | [4, 5, 14, 18, 21, 23, 26, 29, 36, 37, 38, 47, 54, 67] |
| | The response measures are related to general respect for the environment (e.g. saving water, sorting waste) (*n* = 8) | 0.13 | [5, 21, 22, 23, 25, 28, 34, 38] |
| | Other problems are deemed more relevant than CC (*n* = 10) | 0.16 | [6, 11, 19, 20, 29, 37, 38, 40, 59, 64] |
| **Emotions** | Fear (*n* = 10) | 0.22 | [5, 9, 10, 12, 15, 18, 25 38, 48, 54] |
| | Guilt (*n* = 6) | 0.13 | [5, 15, 36, 48, 50, 59] |
| | Sadness (*n* = 5) | 0.11 | [5, 9, 10, 12, 25] |
| | Anger/rage/indignation (*n* = 5) | 0.11 | [5, 10, 15, 18, 37] |
| | Impotence/desperation (*n* = 5) | 0.11 | [5, 10, 25, 37, 59] |
| | Fatalism/pessimism (*n* = 5) | 0.11 | [9, 10, 12, 23, 25] |
| | Others (e. g., concern, mistrust, resignation, indifference, nostalgia, hope, compassion) (*n* = 9) | 0.20 | [5, 10, 15, 25, 29, 48, 50, 56, 59] |
| **Information sources** | Mass media (*n* = 12) | 0.46 | [11, 19, 20, 23, 26, 28, 35, 38, 44, 52, 53, 54] |
| | Internet/social media (*n* = 6) | 0.23 | [2, 12, 18, 20,28, 38] |
| | Television (*n* = 5) | 0.19 | [11, 12, 20, 28, 38] |
| | Press (*n* = 3) | 0.11 | [11, 12, 38] |

Note: the article ID matches those in the list in the Appendix. The relative frequency (RF) at which each code appears in relation to the total number of elements in the category is indicated.

CC is often objectified through images of its biophysical consequences (Table 4), using a language that denotes a catastrophic vision (e. g., danger, threat). Anchoring, in turn, takes place in relation to other environmental problems, particularly through a generic reference to pollution. The persistence of erroneous notions about CC, such as its causal relationship with the hole in the ozone layer, or the indiscriminate use of the terms *climate* and *weather* even amongst groups with a university education linked to climate science, is striking.

The authors often identify a social, geographic and/or time distancing within their study groups, meaning that CC is placed in a global context, in remote places or societies, or that the reference to local implications is rare and that it is perceived as a phenomenon whose potential threat is deferred to a distant future. Thus, while CC is deemed a relevant problem, other problems are considered more urgent due to the psychological intensity and proximity with which they are perceived. According to some of the articles reviewed, this could explain why the mention of response measures is limited or absent and, when they do exist, that they are usually individual actions aimed at caring for the environment in general, which are easy to introduce into people's daily lives (saving water or sorting waste, for example). Along the same lines, in the analysis, it was detected that it is common to divert the responsibility to act to *others*, while personal and local collective responses are rarely mentioned.

While these elements are frequently reported in the research analysed, thus portraying a hegemonic representation of CC, the key themes identified shed light on other, more specific, aspects of the representations, their contents and formation.

### 3.3. SRCC in educational research

In the field of educational research, the contributions of the international group entitled "Respuestas educativas y sociales al CC [Educational and social responses to CC]" (Resclima; http://resclima.info/; *n* = 15) can be highlighted. This group was created in 2013 and comprises scholars from Spain, Portugal, Italy, Canada, Brazil and Mexico who recognised the need to identify the role of educational institutions in the formation of SRCC and to acknowledge the limitations of current educational models when it comes to providing and developing the skills required to respond to CC.

Among the articles analysed, several seek to determine whether there are differences between groups in line with the degree of progress in their academic studies (Calixto, 2020; Meira and Arto-Blanco, 2014), the area of knowledge in which they specialise (Escoz et al., 2019a, 2019b; García-Vinuesa et al., 2020; Méndez-Cadena et al., 2020; Parra et al., 2013), in terms of their geographic or social context (Bello et al., 2017; García-Vinuesa et al., 2022; Ramírez and González, 2016; Vargas et al., 2018), or a combination of these variables (Arto-Blanco et al., 2017). In general, the articles report that the SR are quite similar across the groups studied. However, Arto-Blanco et al. (2017) and Bello et al. (2017) report differences between the SRCC of students in Mexico and Spain, linked to differences in their cultural and curricular contexts, while Ramírez and González (2016) reported differences depending on the areas of knowledge of university students.

However, the most important difference found among students is related to their level of studies. University students at advanced stages of their degrees usually have a much broader vocabulary to express themselves about CC (Calixto, 2020); they establish more connections between CC and other social problems; they recognise its political dimension and the distinct responsibility of individuals and nations to a greater extent; they identify the production model as the root of the problem (Meira and Arto-Blanco, 2014; Arto-Blanco et al., 2017; Vargas et al., 2018; Méndez et al. 2020), all of which are notions that tend to be missing in the representations of secondary and pre-university students (Bello et al., 2017; Calixto, 2022). Despite these differences, the core contents of the SRCC are essentially the same, meaning that the differences affect peripheral elements that enrich the SR without substantially modifying it (Calixto, 2020). This is evidenced by the fact that erroneous notions about CC persist and, notably, that the contents do not have a significant influence on students' attitudes or conduct, or on their response to the problem (Meira et al., 2018). This contradiction, in which

acknowledgement and concern for the problem is reported but not reflected in attitude changes, was also observed in other population segments (Dickinson et al., 2013; Moscardo, 2012).

### 3.4. The importance of context in SRCC

The analysis of the documents included in this key theme reveals the influence of context on SRCC. For example, in coastal settings in France and Colombia, Doue et al. (2020) and Bertoldo et al. (2021) identified that CC objectification took place based on its global consequences, but the local impacts to which they were exposed (e. g., storms, intense rainfall, hurricanes) were mentioned.

Furthermore, they found that the familiarity of these populations with hydrometeorological events led them to underestimate the risks.

In rural areas of Mexico, Chile and Colombia, it should be noted that there is no formed SRCC or that it is in the early stages. This is seen in the fact that there is either no knowledge of the term (Cayul and Quilaqueo, 2019) or there is a lack of understanding about it. Maldonado et al. (2017) argue that this may be due to the fact that the term has only recently appeared in the cultural context of these people. The projects by Cayul and Quilaqueo (2019) with Mapuche-Pehuenche communities and by Núñez (2019) and Núñez et al. (2021) with Andean farmers highlight the knowledge that the interviewees have about climate changes in relation to their farming activities and to their daily lives. Moreover, given that their activities depend on weather and climate conditions, these groups have taken measures to adapt that do not rely on an institutional response, which, generally speaking, is insufficient and responds to interests that are not aligned with the needs and concerns of local inhabitants.

The research done by Cayul and Quilaqueo (2019) and Moloney et al. (2014) highlights the differences in SRCC of groups living in the same context. In the first case, the difference in the world view and the relationship to nature between the Mapuche communities and the decision-makers in Chile leads to different SRCC. In the second case, although elements of the hegemonic SRCC are shared by scientists and non-scientists in Australia, there are significant differences in their peripheral elements which could hinder communication between the two groups. For example, technical terms like *adaptation* are shared by members of the government and scientists but not used by the general public.

The differences in the SRCC are also evident among inhabitants of different countries. For example, when comparing the SRCC of inhabitants of France and Germany, Caillaud and Flick (2013) reported that, while CC was objectified using similar images and concepts, there are also important differences. Among Germans, the problem is related to changes in their immediate surroundings, so it is classified as a geographically close threat. Among the French, in turn, the problem is predominantly related to international political and economic issues. Coinciding with the findings of Wibeck et al. (2014) in Sweden, the French public felt that individual actions only become relevant if the majority of the population puts them into practice.

Despite the fact that CC has an impact on all economic activities, the research aimed at understanding its impact on tourism was distinctive. The projects by Moscardo (2012) and Dickinson et al. (2013) underscored tourists' resistance to modifying their practices, even when there was a concern about tourism contributing to CC. This resistance is expressed through strategies that enable tourists to cope with guilt and continue to enjoy travelling. In particular, these include compartmentalisation of holiday periods as temporary spaces unrelated to daily life, in which environmental concerns are temporarily suspended.

The study by Atzori et al. (2019) evaluated tourists' responses to the potential impacts of CC in a tourist destination in Florida. They found that travellers show an intention to continue visiting this destination despite the possible impacts of CC. However, it is possible that they are unaware of, underestimate or deny the nature and magnitude of these changes, particularly people with polemic representations of CC. Although the tourists show a willingness to return to this tourist destination after adaptation strategies are implemented that could modify the

appearance of the location, Schliephack and Dickinson (2016) suggest using caution with this data, noting that intentionality is not necessarily synonymous with behaviour.

### 3.5. SRCC in the media

The TSR acknowledges that the media is an important source of information and dissemination of social representations. Numerous studies have confirmed that television, the press and, recently, social media, are the main sources of information about CC among the general public (Table 3), which makes it crucial to understand their contents and the processes that motivate their spokespeople.

López et al. (2020) and Kay and Gaymard (2021) found that, in the press in Argentina and Cameroon, respectively, the media coverage is dominated by the international political agenda, disconnected from local settings and, in the case of Cameroon, linked to notions of external assistance and financial dependence.

Fernández and Águila (2015), in the Spanish press, and Caillaud et al. (2012), in a comparative analysis of the French and German press, note that the predominance of the political framework may stem from the fact that media coverage of CC increases when extreme weather events occur or when international negotiations, agreements or conferences take place. Caillaud et al. (2012) also identified different communication strategies in the German and French press. In the former, the use of religious metaphors gave rise to a representation of CC that carried a heavy moral burden, while in the latter the political and financial risks of climate negotiations are emphasised through the use of war-related metaphors. This could partly explain the differences between the populations of these two countries in the SRCC reported by Caillaud and Flick (2013).

In settings in which CC has been heavily politicised (the United States, United Kingdom and Australia, for example), where SRCC polarise political ideologies and identities, the communication strategies used by the media have been studied.

Jaspal et al. (2016) identified the construction of opposing identities in the Australian press: scientists against sceptics, associated with hegemonic and polemic representations of CC, respectively. The sceptics define climate scientists as greedy individuals whose false interests lead them to exaggerate and even make up facts at their own convenience in order to place CC as a priority issue in the social agenda. This image is reinforced by emphasising the scientific uncertainties, taking the epistemological uncertainty constantly referred to in climate science out of context. Similar strategies were identified in the analysis of the discussions about climate science in the British newspaper the Daily Mail (Jaspal et al., 2013), following the Climategate event in 2009. This episode, which consisted in the unlawful disclosure of emails from the Climatic Research Unit at the University of East Anglia, was used by diverse denialist groups to question the legitimacy of scientific work and of climate science in particular (Jaspal et al., 2013).

Similarly, Pearce and Nerlich (2017) analysed the SRCC in the documentary *An Inconvenient Truth* by Al Gore. While the value of the documentary for disclosing and drawing the lay public's attention to the climate crisis is acknowledged, it also prompted the emergence of a polemic representation, largely attributed to the political figure of Al Gore. The authors' analysis highlights that the way in which scientific information is presented can raise doubts about the validity of the contents conveyed if the messenger and his or her identity are also involved in the message (Pearce and Nerlich, 2017).

However, the documentary succeeded when it came to the speaker's ability to appeal to his audience through stories and metaphors that enable them to perceive the problem as something close to them. Callaghan and Augoustinos (2013) noted that, in the Australian press, scientists' use of technical language, with figures and statistics, to discuss climate science generated a distancing of the audience, as the topic was portrayed as something abstract and remote. On the other hand, sceptics recognise and value common-sense knowledge, try to use simple language and rhetoric and even appeal to the public's intuition, knowing

that past experience may contradict some of the key facts of the scientific representation of CC. Thus, the familiarity of sceptics' way of communicating is highly attractive, and their success is not surprising, particularly in contexts in which CC and denial thereof can become identifying features of a certain political ideology. In scenarios in which hegemonic and polemic representations of CC come into confrontation, Uzelgun et al. (2016) recognised that a constructivist vision of science that admits its limitations makes it possible to shift the debate about the accuracy and reliability of climate science toward its specific implications, focusing attention on the strategies required for action in scenarios of uncertainty.

The research on SRCC in the media has shown the relevance of emotions and the way they are manipulated. Höijer (2010) and Olausson (2011) reported that, in Sweden, CC is often characterised as a threat, which anchors the problem in fear. While it may have a mobilising effect, this emotion can lead the public to experience emotional fatigue, fostering desperation and inaction. In addition to fear, Höijer (2010) identified other emotions activated in the media, including guilt, compassion, nostalgia and hope. Similar findings have been reported in the field of educational research (Bello et al., 2017; Calixto and Terrón, 2018; García-Vinuesa et al., 2022). According to Höijer (2010), these emotions are anchored to the SRCC through discourse and images, facilitating recognition thereof and a comparison with objects that awaken similar emotions.

### 3.6. SRs of responses to CC

Several papers within this key theme underscore the relevance of the social dimension in SRCC, given that people most clearly take a stance and react emotionally when confronted with the specific perspective of projects or actions in response to CC.

Upham et al. (2018) and Banerjee et al. (2017), for example, argue that the assessment of SRs of mitigation or adaptation measures to be implemented in a given context is essential, because in this way it is possible to identify whether they are perceived as a threat and how they are related to a sense of attachment to a place, a decisive emotional component in people's attitudes. Banerjee et al. (2017) emphasise the use of the TSR as an alternative to NIMBY (*not in my backyard*) perspectives, which assume that local opposition to mitigation projects is the result of the inhabitants' selfishness, a stance that has been criticised as reductionist. The papers by Jaspal and Nerlich (2014) and Bigl (2020) coincide in this aspect, based on their research on the SRs of fracking in the United Kingdom.

Im et al. (2021) studied the representation of geothermal plants among residents of Pohang, South Korea. In this town, an earthquake occurred in 2017, the origins of which were linked to the activities of a geothermal plant, generating a negative view of these plants and, based on anchoring processes, this view spread, leading to the rejection of other energy sources. Similarly, Wibeck et al. (2015) found that, within a segment of the population that is unfamiliar with geoengineering, based on a limited amount of information, this term is anchored to other technologies such as cloning, cancer treatment or genetically-engineered products and, along with them, to the emotions and attitudes they prompt.

The papers by Olausson (2018; 2019) analyse how livestock farming, a significant contributor of greenhouse gases, is legitimised in the daily discourse of social media. Olausson identified strategies for justifying behaviour, minimising the problem or diverting attention when the information disclosed conflicts with people's beliefs or conduct. Furthermore, in the public sphere of social media, the reliability and accuracy of the information sources used by the posters is brought seriously into question and tends to generate polarisation in the discussion.

## 4. Discussion

Through the analysis of the literature on SRCC, it can be surmised that, while there is an overall understanding of CC, mediated mainly through its anchoring to the category of *environmental problems*, this comprehension is insufficient to prompt a response that is aligned with the urgency of the issue. CC remains systematically categorised as a biophysical

phenomenon rather than a socio-environmental problem, and options for responding to the problem are absent or marginal elements of the SRCC.

Based on the premise that tackling the climate crisis requires radical transformations in our way of inhabiting the world, it is urgent to develop, learn and implement tools that will enable us to move in the direction of that transformation. This task is not being addressed in the representations spread in educational contexts or broadcast in the media (González and Meira, 2020; Jones and Davison, 2021; Tavares et al., 2020). Given that lifestyles and consumer habits that are at the root of the problem are promoted in the media (Oreskes and Conway, 2010), it is unlikely that the media will encourage the public to question capitalism or promote alternative ways of behaving in the world (García-Vinuesa et al., 2020; González and Meira, 2020). Moreover, while education has the potential to drive social transformation, it is also constricted by the limitations of educational institutions (Jones and Davison, 2021; Salonen et al., 2023). In this regard, the opportunities offered by other educational agents, such as non-governmental organisations, civic associations, climate activist groups and grassroots movements, may play a highly relevant role as catalysts of more profound social transformations. Harnessing the synergies between these 'informal' agents and school institutions could be one way to strengthen the approach to the climate crisis in the curriculum, establishing connections to representations that are more complex and realistic about the potential threat (Bigl, 2020; Iati, 2008; Jones and Davison, 2021). It is imperative to address this shortcoming while taking care to avoid simplistic solutions or *false alternatives*, i.e., those that do not question the root problem and merely perpetuate the continuity of the capitalist model (Parrique, 2022; Tornel and Montaño, 2023). In educational institutions, developing projects within the educational space itself or in local spaces and institutions has proven to provide enriching experiences for students, as these projects equip them with power to take action and enable them to develop the skills they need to undertake collective action (Maldonado-González, 2022).

Regardless of the context, it is particularly important to recognise people's emotional response and to offer emotional management tools that allow them to feel fear without freezing up, to be concerned without minimising the problem, to accept responsibility without feeling overwhelmed by guilt and to discern the complexity of the problem without being overcome by desperation or impotence. Tackling CC requires individuals and societies to have the capacity to navigate uncertainty and to transform uncomfortable emotions into mobilising emotions (Brulle and Norgaard, 2019; Poma, 2018; Poma and Gravante, 2021). The studies on SRCC that explicitly included an analysis of the emotional dimension are highly enlightening in understanding, on the one hand, the motives that drive individual and collective action and, on the other, gaining a more detailed understanding of how meaning is attached and the information received is reinterpreted socio-culturally (Calixto and Terrón, 2018; Höijer, 2010; Olausson, 2011). Therefore, including this in future research is recommended.

As the effects of CC become more evident and its impacts start directly affecting a larger number of people, SRCC may evolve at a swifter pace, given that the objectification processes will be influenced by the life experience of these impacts. Longitudinal research, in which these and other changes in SRCC can be mapped, offers an area of opportunity for further understanding how people attach meaning to the problem and to devise ways of effectively responding to it.

The importance of identifying and properly arranging the knowledge that people have about their context, about changes in the environment and modifications in climate or natural cycles, and recognising them before and while implementing CC response strategies must be highlighted. This is particularly evident in historically marginalised contexts and communities that are highly socially and environmentally vulnerable, and therefore it is important to conduct research on SRCC that reveals the views of the people living in such locations, in order to avoid perpetuating reductionist narratives like NIMBY perspectives.

It is also essential to continue studying the processes of denialism and ideological polarisation regarding CC and their impact on the policies of response to the problem. As the policies for responding to the climate crisis become more ambitious, prompted by the

increasing intensity of the most harmful manifestations of the crisis, the cultural struggles to establish a certain social representation of CC could be exacerbated. The findings by Atzori et al. (2019) and Moscardo (2012), who noted that a polemic representation of CC does not necessarily entail a rejection of pro-environmental measures, since people acknowledge that it is important to care for the environment, regardless of their stance on climate change, are encouraging. In addition, authors like Norgaard (2006) and Wullenkord and Reese (2021) found that denialism may be an emotional management tool for avoiding uncomfortable emotions or a defence strategy when the information is perceived as a threat to their identity. This review reveals that profound changes must be made in the form and content of education and social communication about CC. To do this, the knowledge acquired in research about SRCC must be made available to those who disseminate this research and put it into practice: educators, instructors, speakers, scientific writers and leaders of social movements, to mention just a few potential mediators. The importance of the individuals who are responsible for drafting and implementing public policies in governments around the world must be stressed. In this regard, transdisciplinary approaches may be highly enriching, while at the same time providing the strategic groundwork for developing and strengthening social capabilities that must be urgently implemented in light of this crisis, which is already seriously affecting life on the planet.

## 5. Conclusions

This article offers a critical review of 67 published documents about social representations of climate change. The analysis showed the potential that the Theory of Social Representations has for studying complex socio-environmental problems like climate change and for an educational approach thereto, while also affording a broad overview of the findings published in this line of research over the last 15 years.

The study has certain methodological limitations that must be taken into account, which should be addressed in subsequent approaches. In this regard, it is worth noting the possible biases that could arise from the exclusion of documents in languages other than English or Spanish. Furthermore, the sample could be expanded by including the terms "*calentamiento global*/global warming", which is commonly used as a synonym for climate change but was not included in this search. In future reviews, terms that could offer a complementary view of the matter, such as "energy", "environmental problems", "mitigation", "adaptation" and "sustainability", to name just a few, could also be added.

One concerning issue highlighted by the research findings is the lack of social responses to climate change that address the root problem. Therefore, we believe it is important to conduct research that spans more diverse geographic and social contexts, as well as a wider variety of social stakeholders, thus affording a more in-depth view of the causes of this inaction.

In addition, we feel it is necessary to carry out longitudinal studies that aid in understanding the evolution of SRCC, in light of the pronounced effect of extreme climate events, and how this affects the social response to CC. Finally, we consider that including the emotional dimension in SR studies would be enriching because this would provide a better understanding of the processes that drive or hinder action.

## Appendix

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 1 | Batel, S., Castro, P., Devine-Wright, P., & Howarth, C. | Developing a critical agenda to understand pro-environmental actions: Contributions from social representations and social practices theories | 2016 | *WIREs Climate Change* | https://doi.org/10.1002/wcc.417 | social representations theory, theories of practice, critical approach, pro-environmental actions | Review article | * |
| 2 | González, E. | La representación social del cambio climático. Una revisión internacional | 2012 | *Revista Mexicana de Investigación Educativa* | https://www.redalyc.org/articulo.oa?id=14024273003 | medio ambiente, representación social, percepción, educación y comunicación, educación ambiental | Review article | * |
| 3 | Jaspal, R., Nerlich, B., & Cinnirella, M. | Human responses to climate change: Social representation, identity and socio-psychological action | 2014 | *Environmental Communication* | https://doi.org/10.1080/17524032.2013.846270 | climate change, communication, social representation, identity, identity process theory, public understanding | Review article | * |
| 4 | Arto-Blanco, M., Meira-Cartea, P., & Gutiérrez-Pérez, J. | Climate literacy among university students in Mexico and Spain: Influence of scientific and popular culture in the representations of the causes of climate change | 2017 | *International Journal of Global Warming* | https://doi.org/10.1504/IJGW.2017.084791 | climate change, global warming, causes, climate literacy, higher education | Research article | México y España |
| 5 | Bello, L., Meira, P., y González, E. | Representaciones sociales sobre cambio climático en dos grupos de estudiantes de educación secundaria de España y bachillerato de México | 2017 | *Revista Mexicana de Investigación Educativa* | https://www.redalyc.org/articulo.oa?id=14050493008 | representación social, educación ambiental, educación media, educación media superior | Research article | México y España |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 6 | Bello, L., y Cruz, G. | Profesorado universitario ante el cambio climático. Un acercamiento a través de sus representaciones sociales | 2020 | *Revista Mexicana de Investigación Educativa* | https://www.redalyc.org/articulo.oa?id=14065615011 | educación superior, práctica educativa, cambio climático, representación social | Research article | México |
| 7 | Bello, L., Cruz, G., Meira, P., y González, E. | El cambio climático en el bachillerato. Aportes pedagógicos para su abordaje | 2021 | *Enseñanza de las ciencias* | https://doi.org/10.5565/rev/ensciencias.3030 | climate change, environmental education, social representation, high school | Research article | México |
| 8 | Calixto, R. | Medio ambiente y educación ambiental: Representaciones sociales de los profesores en formación. | 2010 | *Magis. Revista Internacional de Investigación en Educación* | https://revistas.javeriana.edu.co/index.php/MAGIS/article/view/3521 | medio ambiente, educación ambiental, representaciones sociales, práctica docente | Research article | México |
| 9 | Calixto, R. | El cambio climático en las representaciones sociales de los estudiantes universitarios | 2018 | *Revista Electrónica de Investigación Educativa* | https://doi.org/10.24320/redie.2018.20.1.1443 | educación ambiental, representación social, universitarios | Research article | México |
| 10 | Calixto, R. y Terrón, E. | Las emociones en las representaciones sociales del cambio climático | 2018 | *Educar em Revista* | https://doi.org/10.1590/0104-4060.55684 | educación ambiental, emociones, representaciones sociales, cambio climático | Research article | México |
| 11 | Calixto, R. | Mirada compartida del cambio climático en los estudiantes de bachillerato | 2020 | *Revista Mexicana de Investigación Educativa* | https://www.redalyc.org/articulo.oa?id=14065615008 | educación ambiental, educación media superior, representaciones sociales, cambio climático | Research article | México |
| 12 | Calixto, R. | Estudiantes de bachillerato y cambio climático. Un estudio desde las representaciones sociales | 2022 | *Revista Electrónica Educare* | https://doi.org/10.15359/ree.26-3.14 | representaciones sociales, cambio climático, educación ambiental, estudiantes, bachillerato | Research article | México |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 13 | Escoz, A., Arto, M., Meira, P., & Gutiérrez, J | Social representations of climate change among Spanish university students of social sciences and humanities. | 2019 | *Interdisciplinary Environmental Studies* | https://doi.org/10.18848/2329-1621/CGP/v13i02/1-14 | climate change, social representations, university, climate literacy, climate education | Research article | España |
| 14 | Escoz-Roldán, A., Gutiérrez, Pérez, J., & Meira, P. | Assessment of climate literacy levels and social representations in academics from three climate contexts | 2019 | *Water* | https://doi.org/10.3390/w12010092 | goals, agenda 2030, university students, climate literacy, social representation | Research article | España y Portugal |
| 15 | Ferrari, E., Martínez, F., y Ruíz, C. | La eficiencia de un MOOC de ciencia básica en español para mejorar la representación social del cambio climático | 2020 | *Communication & Methods* | https://doi.org/10.35951/v2i2.81 | cursos masivos en línea y abiertos (MOOCs), representación social (RS) | Research article | América Latina, España, Italia, Portugal y África |
| 16 | García-Vinuesa, A. y Meira-Cartea | Caracterización de la investigación educativa sobre el cambio climático y los estudiantes de educación secundaria | 2019 | *Revista Mexicana de Investigación Educativa* | https://dialnet.unirioja.es/servlet/articulo?codigo=7135281 | educación ambiental, educación media, estudios bibliométricos, investigación educativa | Review article | * |
| 17 | García-Vinuesa, A., Meira, P., Caride, J., e Iglesias, M. | La representación del cambio climático en la universidad: valoraciones y creencias del alumnado | 2020 | *Educação e Pesquisa* | https://doi.org/10.1590/S1678-4634202046229768 | estudiantes universitarios, cambio climático, representaciones sociales, alfabetización climática | Research article | España |
| 18 | García-Vinuesa, A., Meira, P., y Caride, J. | El cambio climático en la educación secundaria: conocimientos, creencias y percepciones. | 2022 | *Enseñanza de las Ciencias* | https://doi.org/10.5565/rev/ensciencias.3526 | environmental education, social representations, high school, climate literacy, climate crisis | Research article | España e Italia |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 19 | González, E. y Meira, P.r | Educación, comunicación y cambio climático. Resistencias para la acción social responsable | 2009 | *Trayectorias* | https://www.redalyc.org/articulo.oa?id=60712749003 | educación ambiental, cambio climático, resistencias culturales, obstáculos sociales para la acción colectiva | Review article | * |
| 20 | González, E., y Maldonado, A. | ¿Qué piensan, dicen y hacen los jóvenes universitarios sobre el cambio climático? Un estudio de representaciones sociales | 2014 | *Educar em Revista* | https://doi.org/10.1590/0104-4060.38106 | cambio climático, representación social, jóvenes universitarios, Veracruz, México | Research article | México |
| 21 | Lee, K., & Barnett, J. | Adolescents' representations of climate change: Exploring the self-other tema in a focus group study | 2022 | *Environmental Communication* | https://doi.org/10.1080/17524032.2021.2023202 | adolescents, climate change, social representation theory | Research article | Reino Unido |
| 22 | Maldonado-González, A. | Cambio climático en experiencias educativas de profesorado universitario. | 2022 | *Revista Electrónica Educare* | https://doi.org/10.15359/ree.27-1.14345 | educación superior, educación ambiental, cambio climático, vulnerabilidad, resiliencia | Research article | México |
| 23 | Meira-Cartea, P., y Arto-Blanco, M. | Representaciones del cambio climático en estudiantes universitarios en España: aportes para la educación y la comunicación | 2014 | *Educar em Revista* | https://doi.org/10.1590/0104-4060.38041 | educación, cambio climático, representaciones sociales, cultura científica | Research article | España |
| 24 | Meira, P., Gutiérrez, Pérez, J., Arto-Blanco, M., & Escoz-Roldán, A.. | Influence of academic education vs. common culture on the climate literacy of university students | 2018 | *Psyecology* | https://doi.org/10.1080/21711976.2018.1483569 | social representations, climate change, university, literacy | Research article | España |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 25 | Méndez-Cadena, M., Fernández, A., Cruz, A., y Bueno, P. | De la representación social del cambio climático a la acción: el caso de estudiantes universitarios | 2020 | *Revista mexicana de investigación educativa* | https://www.redalyc.org/articulo.oa?id=14065615010 | educación ambiental, cambio climático, educación superior, representación social, medio ambiente | Research article | México |
| 26 | Parra, E., Castillo, C., y Vallejos, M. | Representaciones sociales sobre desarrollo sostenible y cambio climático en estudiantes universitarios | 2013 | *Perspectivas de la comunicación* | - | representación social, prácticas sociales y estudiantes universitarios | Research article | Chile |
| 27 | Porras, Y. | Representaciones sociales de la crisis ambiental en futuros profesores de química. | 2016 | *Ciência & Educação* | https://www.redalyc.org/articulo.oa?id=251046221010 | representación social, crisis ambiental, construcción social, ambiente | Research article | Colombia |
| 28 | Ramírez, Y., y González, E. | Representaciones sociales del cambio climático en estudiantes de dos universidades veracruzanas | 2016 | *Revista de Investigación Educativa* | https://www.redalyc.org/articulo.oa?id=283143550002 | representación social, educación y comunicación, análisis comparativo | Research article | México |
| 29 | Vargas, G., Barba-Núñez, M., Carvalho, A., Vicente-Mariño, M., Arto-Blanco, M., & Meira-Cartea, P. | How do students perceive and evaluate responses to climate change? | 2018 | *Climate Change: Impacts and Responses* | https://doi.org/10.18848/1835-7156/CGP/v10i02/1-19 | climate change, social representations, higher education, focus gropus, comparative studies | Research article | Brasil, México, Portugal y España |
| 30 | Atzori, R., Fyall, A., Tasci, A., & Fjelstul, J. | The role of social representations in shaping tourist responses to potential climate change impacts: An analysis of Florida's coastal destinations | 2019 | *Journal of Travel Research* | https://doi.org/10.1177/0047287518802089 | climate change, social representations theory, coastal destinations, Florida, tourist responses | Research article | Estados Unidos |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 31 | Becken, S. | Evidence of a low-carbon tourism paradigm? | 2017 | *Journal of Sustainable Tourism* | https://doi.org/10.1080/09669582.2016.1251446 | dominant social paradigm, growth, social representation, low-carbon tourism, risks | Research article | Global |
| 32 | Bertoldo, R., Guignard, S., Dias, P., & Schleyer-Lindenmann, A. | Coastal inconsistencies: Living with and anticipating coastal floods risks in southern France | 2021 | *International Journal of disaster Risk Reduction* | https://doi.org/10.1016/j.ijdrr.2021.102521 | coastal floods, social representations, climate change adaptation, risk perception, SARF, place attachment | Research article | Francia |
| 33 | Caillaud, S., & Flick, U. | New meanings for old habits? Representations of climate change in France and Germany | 2013 | *Revue Internationale de Psychologie Sociale* | https://shs.cairn.info/revue-internationale-de-psychologie-sociale-2013-3-page-39?lang=fr | climate change, social representations, practices, anchoring, culture | Research article | Francia y Alemania |
| 34 | Cayul, O., y Quilaqueo, D. | Cambio climático en Lonquimay: conocimiento científico y conocimiento local Mapuche-Pehuenche | 2019 | *Revista Austral de Ciencias Sociales* | https://doi.org/10.4206/rev.austral.cienc.soc.2019.n37-07 | conocimiento científico y mapuche, cambio climático, comunidades de Lonquimay | Research article | Chile |
| 35 | Chen, M. | Social representations of climate change and pro-environmental behavior intentions in Taiwan | 2019 | *International Sociology* | https://doi.org/10.1177/0268580919832737 | climate change, pro-environmental behavior intentions (PEBs), social representations theory (SRT) | Research article | Taiwán |
| 36 | Dickinson, J. E., Robbins, D., Filimonau, V., Hares, A., & Mika, M. | Awareness of tourism impacts on climate change and the implications for travel practice: A Polish perspective | 2013 | *Journal of Travel Research* | https://doi.org/10.1177/0047287513478691 | climate change, behavioral change, travel practice, Poland | Research article | Polonia |
| 37 | Doue, C., Navarro, O., Restrepo, D., Krien, N., Rommel, D., Lemee, C., Coquet, M., Mercier, D., & Fleury-Bahi, G. | The social representations of climate change: Comparison of two territories exposed to the coastal flooding risk | 2020 | *Change Strategies and Management* | https://doi.org/10.1108/IJCCSM-11-2019-0064 | social representation theory, climate change, coastal flooding, environmental psychology approach | Research article | Francia y Colombia |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 38 | Maldonado, A., González, E., y Cruz, G. | Una aproximación a la representación del cambio climático en habitantes de dos cuencas del estado de Veracruz, México | 2017 | *Revista Pueblos y Fronteras Digital* | https://doi.org/10.22201/cimsur.18704115e.2017.23.291 | educación ambiental, representación social, cambio global | Research article | México |
| 39 | Moloney, G., Leviston, Z., Lynam, T., Price, J., Stone-Jovicich, S., & Blair, D. | Using social representations theory to make sense of climate change: What scientists and nonscientists in Australia think | 2014 | *Ecology and Society* | http://dx.doi.org/10.5751/ES-06592-190319 | adaptation, climate change, social representations theory, word associations | Research article | Australia |
| 40 | Moscardo, G. | Social representations of climate change: Exploring the perceived links between climate change, the drive for sustainability and tourism | 2012 | *Tourism, climate change and sustainability* | | | Book chapter | * |
| 41 | Núñez, R. | Effects of climate change on the resources of the rural ecosystem, a view from farmer perspectives | 2019 | *Journal of Physics: Conference Series* | https://doi.org/10.1088/1742-6596/1386/1/012147 | | Research article | Colombia |
| 42 | Núñez, R., Carvajal, J., Carrero, D., Ramírez, L., & Sánchez, J. | Representations of Colombian Andean farmers on climate change and mitigation and adaptation strategies | 2021 | *Revista de Economía e Sociología Rural* | https://doi.org/10.1590/1806-9479.2021.220439 | agriculture, climate change, social representations | Research article | Colombia |
| 43 | Schliephack, J., & Dickinson, J. | Tourists' representations of coastal managed realignment as a climate change adaptation strategy | 2016 | *Tourism Management* | https://doi.org/10.1016/j.tourman.2016.08.004 | climate change, managed realignment, social representations, coastal erosion | Research article | Reino Unido |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 44 | Wibeck, V. | Social representations of climate change in Swedish lay focus groups: Local or distant, gradual or catastrophic? | 2014 | *Public Understanding of Science* | https://doi.org/10.1177/0963662512462787 | climate change, focus group, interaction, metaphor, objectification, social representations | Research article | Suecia |
| 45 | Caillaud, S., Kalampalikis, N., & Flick, U. | The social representation of the Bali climate conference in the French and German media | 2012 | *Journal of Community & Applied Social Psychology* | https://doi.org/10.1002/casp.1117 | climate change, climate conference, social representations, France, Germany, media, triangulation | Research article | Francia y Alemania |
| 46 | Callaghan, P., & Augoustinos, M. | Reified versus consensual knowledge as rhetorical resources for debating climate change | 2013 | *Revue Internationale de Psychologie Sociale* | https://shs.cairn.info/journal-revue-internationale-de-psychologie-sociale-2013-3-page-11?lang=en | climate change, social representations, science communication, information-deficit model | Research article | Australia |
| 47 | Fernández, R., & Águila, J. | The increase of 2° C in climate change communication in Spanish newspaper *El País* | 2015 | *Razón y Palabra* | https://www.revistarazonypalabra.org/index.php/ryp/article/view/839 | cambio climático, medios de comunicación, objetivo climático, 2°C | Research article | España |
| 48 | Höijer, B. | Emotional anchoring and objectification in the media reporting on climate change | 2010 | *Public Understanding of Science* | https://doi.org/10.1177/0963662509348863 | anchoring, climate change, emotions, news media, objectification, social representations theory | Research article | Suecia |
| 49 | Jaspal, R., Nerlich, B., & Koteyko, N. | Contesting science by appealing to its norms: Readers discuss climate science in the *Daily Mail* | 2013 | *Science Communication,* | https://doi.org/10.1177/1075547012459274 | climate change, skepticism, social media, social representation, public understanding, critical discourse analysis, social psychology | Research article | Reino Unido |
| 50 | Jaspal, R., & Nerlich, B. | When climate science became climate politics: British media representations of climate change in 1988 | 2014 | *Public Understanding of Science* | https://doi.org/10.1177/0963662512440219 | climate change, communication, media, qualitative, social psychology, social representations | Research article | Reino Unido |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 51 | Jaspal, R., Nerlich, B., & van Vuuren, K. | Embracing and resisting climate identities in the Australian press: Sceptics, scientists and politics | 2016 | *Public Understanding of Science* | https://doi.org/10.1177/0963662515584287 | climate change, identity media, scepticism, social representations | Research article | Australia |
| 52 | Kay, N., & Gaymard, S. | Climate change in the Cameroonian press: An analysis of its representations | 2021 | *Public Understanding of Science* | https://doi.org/10.1177/0963662520976013 | Cameroon, climate change, media coverage, similarity analysis, social representations | Research article | Camerún |
| 53 | López, M., Florencia, M., Müller, G., Gómez, A., Staffolani, C., & Aragonés, L. | Climate change communication by the local digital press in Northeastern Argentina: An ethical analysis | 2020 | *Science of the Total Environment* | https://doi.org/10.1016/j.scitotenv.2019.135737 | climate change, digital press, ethical perspective, social representations | Research article | Argentina |
| 54 | Olausson, U. | "We're the ones to blame": Citizens' representations of climate change and the role of the media | 2011 | *Environmental Communication: A Journal of Nature and Culture* | https://doi.org/10.1080/17524032.2011.585026 | news media, media effects, media audience, public, social representation theory, climate change | Research article | Suecia |
| 55 | Pearce, W., & Nerlich, B. | 'An inconvenient truth': A social representation of scientific expertise | 2017 | *Science and the politics of openness: Here be monsters* | | | Book chapter | Estados Unidos |
| 56 | Uzelgun, M., Lewinski, M., & Castro, P. | Favorite battlegrounds of climate action: Arguing about scientific consensus, representing science-society relations | 2016 | *Science Communication* | https://doi.org/10.1177/1075547016676602 | deep disagreement, climate change contrarians, representations of science, argumentation, social representation | Research article | Portugal y Turquía |
| 57 | Banerjee, A., Schelly, C., & Halvorsen, K. | Understanding public perceptions of wood-based electricity production in Wisconsin, United States: The place-based dynamics of social representations | 2017 | *Environmental Sociology* | https://doi.org/10.1080/23251042.2016.1272181 | public perceptions of technology, bioenergy, renewable energy, place-based approach, social representation theory, bioelectricity | Research article | Estados Unidos |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 58 | Bigl, B. | Stop the frack! Exploring the media's portrayal of the social representation of an anti-fracking protest at the Baltic Sea | 2020 | *Environmental Communication* | https://doi.org/10.1080/17524032.2019.1651367 | fracking, hydraulic fracturing, media coverage, social representation theory, public protest, grassroots communication | Research article | Alemania |
| 59 | Fischer, A., Peters, V., Neebe, M., Vávra, J., Kriel, A., Lapka, M., & Megyesi, B. | Climate change? No, wise resource use is the issue: Social representations of energy, climate change and the future | 2012 | *Environmental Policy and Governance* | https://doi.org/10.1002/eet.1585 | climate change, emotions, energy, natural resource use, normative, social representations, sustainability | Research article | Hungría, Alemania, Escocia, República Checa y Países Bajos |
| 60 | Im, D. H., Chung, J. B., Kim, E. S., & Moon, J. W. | Public perception of geothermal power plants in Korea following the Pohang earthquake: A social representation theory study | 2021 | *Public understanding of science (Bristol, England)* | https://doi.org/10.1177/09636625211012551 | enhanced geothermal systems (EGS), nuclear power plant, Pohang, earthquake, social representations theory (SRT) | Research article | Corea |
| 61 | Jaspal, R., & Nerlich, B. | Fracking in the UK press: Threat dynamics in an unfolding debate | 2014 | *Public Understanding of Science* | https://doi.org/10.1177/0963662513498835 | communication, fracking, media, social representations theory | Research article | Reino Unido |
| 62 | Lynam, T., & Walker, I. | *Making sense of what enables and what constrains adaptation to climate change* | 2011 | *19th International Congress on Modelling and Simulation, Perth, Australia* | https://www.jstor.org/stable/26269988 | sensemaking, adaptation, climate change, word associations, modelling | Conference paper | Canadá y Australia |
| 63 | Lynam, T. | Exploring social representations of adapting to climate change using topic modeling and Bayesian networks | 2016 | *Ecology and Society* | http://dx.doi.org/10.5751/ES-08778-210416 | Bayesian network modelling, climate change adaptation, narrative, sense making, social representations, text analysis, topic modeling | Research article | Australia |

| ID | Authors | Title | Year | Journal | DOI/Link | Keywords | Type of document | Country |
|---|---|---|---|---|---|---|---|---|
| 64 | Olausson, U. | "Stop blaming the cows!": How livestock production is legitimized in everyday discourse on Facebook | 2018 | *Environmental Communication* | https://doi.org/10.1080/17524032.2017.1406385 | social media, environmental communication, social representation theory, climate change, meat, lay sense-making | Research article | Suecia |
| 65 | Olausson, U. | Meat as a matter of fact(s): The role of science in everyday representations of livestock production on social media | 2019 | *Journal of Science Communication* | https://doi.org/10.22323/2.18060201 | environmental communication, public understanding of science and technology, science and media | Research article | Suecia |
| 66 | Upham, P., Johansen, K., Bögel, P., Axon, S., Garard, J., & Carney, S. | Harnessing place attachment for local climate mitigation? Hypothesising connections between broadening representations of place and readiness for change | 2018 | *Local Environment* | https://doi.org/10.1080/13549839.2018.1488824 | public objection, land use planning, engagement, place attachment, visioning | Review article | * |
| 67 | Wibeck, V., Hansson, A., & Anshelm, J. | Questioning the technological fix to climate change: Lay sense making of geoengineering in Sweden | 2015 | *Energy Research & Social Science* | http://dx.doi.org/10.1016/j.erss.2015.03.001 | geoengineering, climate change, focus groups, social representations, public engagement | Research article | Suecia |

## Authors' contributions

**Harumi Takano-Rojas:** Conceptualisation; Data curation; Formal analysis; Research; Writing (original draft); Writing (review and editing).

**Alicia Castillo:** Conceptualization; Funding acquisition; Resources; Supervision; Writing (review and editing).

**Pablo Meira-Cartea:** Funding acquisition; Supervision; Writing (review and editing).

## Artificial Intelligence (AI) Policy

The authors do not claim to have made use of Artificial Intelligence (AI) in the preparation of their articles.

## Funding

Research and Technological Innovation Project Support Programme (PAPIIT IN300422). *Educar a tiempo ante la emergencia climática y la transición socioecológica [Educating in time for the climate emergency and socio-ecological transition]*(RESCLIM@TIEMPO) Project, Ref. PID2022-136933OB-C21, funded by MCIN/AEI/10.13039/501100011033/ and by the ERDF Una manera de hacer Europa. Grant awarded by the National Council for Humanities, Science and Technology (CONAHCYT CVU 1004620).

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### 1.1. General reviews

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### 1.2. Educational research

Arto-Blanco, M., & Meira-Cartea, P. (2017). Climate literacy among university students in Mexico and Spain: Influence of scientific and popular culture in the representations of the causes of climate change. *International Journal of Global Warming*, *12*(3/4), 448-467.

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Bello, L., Meira, P., & González, E. (2017). Representaciones sociales sobre cambio climático en dos grupos de estudiantes de educación secundaria de España y bachillerato de México [Social representations of climate change in a group of secondary school students in Spain and a group of high school students in Mexico]. *Revista Mexicana de Investigación Educativa, 22*(73), 505- 532.

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## Acknowledgements

The authors would like to thank Dr Guillermo Murray Tortarolo and Dr Elena Méndez López for their comments on the first version of the manuscript. They are grateful for the funding granted for this research by the Research and Technological Innovation Project Support Programme (PAPIIT IN300422) and the "Educar a Tiempo ante la emergencia Climática y la Transición Socioecológica [Educating in Time for the Climate Emergency and Socio-ecological Transition] (RESCLIM@TIEMPO)" project, ref. PID2022-136933OB-C21, funded by MCIN/AEI/10.13039/501100011033/ and by the ERDF Una manera de hacer Europa. In addition, the first author would like to thank the National Council for Humanities, Science and Technology for the grant received (CONAHCYT CVU 1004620).

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