education sciences

MDPI

Article

Climate Change in School Geography Textbooks (Spain) in the Era of the ICTs: Perception and Teaching According to Teachers

Álvaro-Francisco Morote [1,*] and María Hernández-Hernández [2]

[1] Department of Experimental and Social Sciences Education, Faculty Teaching Training, University of Valencia, 46022 Valencia, Spain
[2] Department of Regional Geographical Analysis and Physical Geography, University of Alicante, 03080 Alicante, Spain; maria.hernandez@ua.es
* Correspondence: alvaro.morote@uv.es

Abstract: Climate change has become one of the major themes in the academic world, as it constitutes a socio-environmental challenge faced by society in the twenty-first century. The objectives of this study, based on the opinions of geography teachers (secondary education and baccalaureate, Spain), were to analyze the frequency of use of school textbooks in geography classes, to examine how climate change is addressed in these resources, to study how teachers impart these contents, and to review the importance of teaching global warming according to the opinions of the teachers. Based on a sample of 96 teachers surveyed between 2019 and 2022, the results show a disparity of opinions regarding textbook use, a not-altogether-adequate treatment of this phenomenon with these resources (the sum of the responses with values of 1 and 2 amounted to 44.8%), and a predominance of an explanation of climate change by teachers through everyday cases in the students' environment (35.4%) and talks and workshops given in class by experts (27.1%). Knowing the use made by teachers of the traditional textbook in the era of the ICTs, their perception of the adequacy of the contents on climate change in these resources, and how this phenomenon is taught is highly relevant to raising awareness and educating the youngest cohorts about one of the main challenges faced by society today.

Keywords: climate change; school textbooks; teaching; teachers; geography

Citation: Morote, Á.-F.; Hernández-Hernández, M. Climate Change in School Geography Textbooks (Spain) in the Era of the ICTs: Perception and Teaching According to Teachers. *Educ. Sci.* **2023**, *13*, 822. https://doi.org/10.3390/educsci13080822

Academic Editors: Carlos Hervás-Gómez, María Dolores Díaz-Noguera, Pedro Román-Graván and Carmen Corujo-Vélez

Received: 20 July 2023
Revised: 3 August 2023
Accepted: 7 August 2023
Published: 10 August 2023

1. Introduction

Today, climate change has become one of the main themes in the academic world, as this phenomenon constitutes one of the most important socio-environmental changes faced by society in the twenty-first century [1–3]. One of the effects, for example, mentioned in the reports on climate change is the increase in extreme atmospheric risks (floods, droughts, heatwaves, etc.). Furthermore, these reports predict that these phenomena will be exacerbated in the short term, both in intensity and in frequency [4]. Therefore, and as insisted on by different authors [5–14], the teaching of this phenomenon at all school levels should be prioritized in order to achieve and increase the resilience of society to adapt to climate change.

The teaching of climate change is highly complex due to the amalgam of factors that are involved [5,7]. As explained by Martínez-Fernández and Olcina [15], it is highly important that students know how to interpret and recognize the different factors (natural and human) that interact so as to show the population the complexity of the causes and consequences at play and to provide arguments and solutions, both collective and individual, to mitigate and adapt to the phenomenon. In addition, in Spain (study area), in social sciences (primary education) and/or geography classes (secondary education and baccalaureate), the textbook continues to be the main or only resource used [16]. As such, climate change is explained with a lack of scientific rigor and excessive catastrophism [17].

ICTs have changed significantly, from the first electronic devices to the current variety of smart mobile devices and digital resources [18]. Different international institutions and

organizations consider that these new applications, resources, and tools could become effective systems for generating educational content [19,20]. Together with ICT, a phenomenon of modification of the teaching–learning models and methodologies has been created whose purpose is the achievement of the so-called key competencies to configure a higher-education system adapted to the new requirements of the society of information technology (SIC) [21]. Therefore, these skills would become necessary tools that allow access to knowledge and training throughout life, contributing to the achievement of results of high personal and social value in different contexts and allowing the achievement of complex goals [22]. After the emergence of new digital media and online teaching and/or blended learning as a result of COVID-19, it would be expected that the use of school textbooks had reduced. However, as found by Morote and Colomer [23], they continue to be the main resource. Even activities that involve some type of technological use (internet, etc.) replicate the procedure and methodology as the traditional textbooks.

As indicated by Bel et al. [16], Sáiz [24] and Valls [25], school textbooks continue to be "uncritical" resources. Therefore, different authors [24,25] have analyzed the interest in textbooks in research in didactics in the social sciences, as they are privileged documentary sources that enable, although with limitations [17], an analysis to be made of what is taught in the classroom.

In Spain, according to the regulatory framework in force (LOMLOE), the teaching of climate change should be conducted from an early age in order to highlight the importance of this phenomenon [26]. This has been incorporated into the education curricula: (1) of primary education (6–12 years), in accordance with Royal Decree 157/2022 of 1 March (in the subject of the natural, social and cultural environment); (2) of secondary education (12–16 years) in the subjects of geography and history (Royal Decree 217/2022 of 29 March); and (3) of baccalaureate (16–18 years) in the subject of geography (Royal Decree 243/2022 of 5 April).

This prominence in the educational field has been further reinforced with the so-called Sustainable Development Goals (SDGs) proposed by the United Nations [27], which include a specific reference to this process (Objective 13—Climate Action). Additionally, Articles 11 and 12 of the Paris Agreement [28] manifest the importance of education to modify habits over the long term and to promote a better understanding and training with respect to addressing climate change and its associated effects. These articles are based on the United Nations Framework Convention on Climate Change (1992; Article 6—"Education, training and public awareness"). For the Spanish case, and only since May 2021, when Law 7/2021 of 20 May on climate change and energy transition was passed, for the first time, a section was dedicated to education in global warming (Title VIII: "Education, research and innovation in the fight against climate change and energy transition") [29].

In the educational field, the topic of climate change faces several challenges in terms of its correct teaching at school: (1) the complexity of teaching content that is complicated even for the scientific community due to the amalgam of factors that intervene [6,7]; (2) the need to teach this subject with scientific rigor [5,30–34]; (3) the lack of training of the teachers in this topic [35]; and (4) the stereotypes and inaccurate information disseminated in the media that influence how this phenomenon is considered and perceived by both students and teachers [9,34,36,37].

The objectives of this research, based on the opinions of active geography teachers (secondary education and baccalaureate, Spain), were: (1) to analyze the frequency of use of school textbooks in geography classes; (2) to examine how climate change is addressed in these resources; (3) to study how teachers impart these contents; and (4) to review the importance of teaching global warming according to the opinions of the teachers. In other words, on the one hand, we verify the use of and opinions on how this phenomenon is treated in the textbooks, and on the other hand, we review how these contents are currently taught by teachers. Furthermore, we analyze whether there are differences based on the discipline in which the teachers who teach the geography classes are trained (geography, history, and art history).

The starting hypotheses are as follows: (1) in relation to the use of the textbook, most of the teachers would respond with values of 4 and 5 (Likert scale: "heavily used"); (2) in relation to how climate change is treated in these resources, the teachers would respond with values of 1 and 2 ("poor information"); (3) with respect to how the teachers teach these contents and the activities carried out, these would be characterized by activities based on talks and workshops given by professionals and activities on the analysis of the causes and consequences of climate change related to the environment of the student (the former, therefore, would be related to a low level of competence and training of the teachers, as they would turn to experts in the subject); and (4) in relation to the importance of teaching these contents, most of the responses would be positive. With respect to the discipline in which teachers are trained, the main differences would be found in the use of the textbook, with geography graduates making less use of these resources, and in relation to the teaching style, the geographers would teach climate change considering the daily life and environment of the students.

2. Methodology

2.1. Research Design

This research used a quantitative methodology [38,39] and a mixed-type questionnaire as an instrument [40–43]. It was a mixed explanatory and correlational study (not experimental) [44,45]. The information obtained from the participants was collected at specific moments between the years 2019 and 2022.

2.2. Context and Participants

The participants in this research were active teachers of secondary education and baccalaureate teaching geography (Spain). Specifically, they were teachers who had participated in different editions of a teacher training course organized by the Centre for Training, Innovation and Resources for teachers of the Region of Valencia (CEFIRE) during the years 2019, 2020, 2021 and 2022. This course, titled "Teaching resources and proposals in response to the new global challenges," has the objective of teaching and raising awareness about the different resources for teaching school geography.

The selection of participants was carried out through non-probabilistic sampling (available or convenience sampling). The total number of teachers enrolled in these years was 96. With respect to age, the average age was 41.9 years. In terms of gender, more than half were women 56.3% (n = 54). It should be noted that in Spain, one feature of geography teaching is that the teachers can either be geography graduates or have a different degree, principally history or art history. In terms of the discipline in which they were trained, the sample of participants was distributed as follows: (1) geography 36.5% (n = 35); (2) history 30.2% (n = 29); (3) art history 8.3% (n = 8); and (4) others 25.0% (n = 24—humanities, geology, tourism, sociology, etc.).

2.3. Research Instrument

For this study, a validated questionnaire that has been used in previous studies was used [46]. The questionnaire has a total of 29 items and is structured into five sections: (1) socio-educational characteristics; (2) training on climate change; (3) the importance of the media; (4) teachers' perception of climate change; and (5) future proposals. For this research, and considering the proposed objectives, the items of Block 4 related to school textbooks, and the teaching of climate change was analyzed: item 23 (specific objective 1), item 24 (specific objective 2), items 25 and 26 (specific objective 3) and item 26 (specific objective 4) (see Table 1).

To corroborate the internal consistency and reliability of the questionnaire, Cronbach's alpha test was used, with a result of $\alpha = 0.818$ showing an acceptable internal consistency and the appropriateness of the instrument for the proposed study [47].

Table 1. Items of the questionnaire analyzed.

Block 4. The Perception that the Teachers Have of Climate Change	
Item (n.)	**Type of Response**
- Item 23. With regard to the geography textbook, how much do you use it? (Give a value from 1 to 5, where 1 is the lowest use and 5 the heaviest use).	- Item 23. Answer Likert Scale (1–5).
- Item 24. Do you consider that these textbooks contain adequate information and activities on climate change? (Give a value from 1 to 5, where 1 is the most negative opinion and 5 the most positive).	- Item 24. Answer Likert Scale (1–5).
- Item 25. How do you currently teach the topic of climate change?	- Item 25. Open answer.
- Item 26. Do you think it is worth teaching climate change in primary education, secondary education and baccalaureate classrooms? Answer from 1 to 5, where 1 is "completely disagree" and 5 "completely agree."	- Item 26. Answer Likert Scale (1–5).

Source: own elaboration.

2.4. Procedure

The questionnaire was administered in the first session of the course (February 2019, 2020, 2021, 2022), with 20 min allowed for completion. It should be noted that all procedures were carried out preserving the anonymity of the participants, with the elaboration of a list of the teachers by numbers and guaranteeing in writing the confidential treatment of the information.

2.5. Data Analysis

The program SPSS v.28 was used to analyze the data and an inferential statistical analysis was conducted and interpreted (nonparametric tests) of frequencies and percentages. To conduct the nonparametric testing, the Kruskal–Wallis H test was used when the nominal variables (disciplinary training and item 25) had to be related to ordinal variables (items 23, 24 and 26) of more than two independent samples. The chi-squared (x^2) test was used when it was necessary to correlate nominal variables (disciplinary training and item 25). To study the relationship between ordinal variables (items 23 and 24), the Spearman rho test was used, following the procedure of other research [44]. It should be noted that the responses to item 25 (open responses) were grouped.

3. Results

3.1. Use of the School Textbook in Geography Classes

The first question analyzed was item 23 ("With regard to the geography textbook, how much do you use it?"). The results showed a disparity of opinions. Those who did not use it (25.0%; $n = 24$) and those who used it a lot (value of 4 (28.1%; $n = 27$) and value of 5 (7.3%; $n = 7$)) comprised 35.4% if the two values are added together (Table 2). When analyzing these results in accordance with the disciplinary training of the teachers, differences may be observed. The teachers who made the heaviest use of the geography textbook were trained in art history (62.5% responded with a value of 4), followed by history (13.8% responded with a value of 5). The category of "others" corresponded to those who used these resources in geography classes the least: 58.3% responded with a value of 1 (Table 2).

The Kruskal–Wallis H test was used to verify whether there were statistically significant differences between the discipline in which teachers were trained (history, geography, art history, others) and the use of the geography textbook. This test indicated that there were (Kruskal–Wallis H = 13.968; $p = 0.003$). The group of teachers trained in the discipline of art history showed the most significant results (Table 3).

Table 2. Responses on the use of the geography textbook (item 23) according to the discipline in which the teachers were trained.

Discipline in Which Teachers Were Trained		1	2	3	4	5	Total
Geography	*n*	5	1	18	9	2	**35**
	%	14.3%	2.9%	51.4%	25.7%	5.7%	**100.0%**
History	*n*	5	3	7	10	4	**29**
	%	17.2%	10.3%	24.1%	34.5%	13.8%	**100.0%**
Art history	*n*	0	0	3	5	0	**8**
	%	0.0%	0.0%	37.5%	62.5%	0.0%	**100.0%**
Others	*n*	14	0	6	3	1	**24**
	%	58.3%	0.0%	25.0%	12.5%	4.2%	**100.0%**
Total	***n***	**24**	**4**	**34**	**27**	**7**	**96**
	%	**25.0%**	**4.2%**	**35.4%**	**28.1%**	**7.3%**	**100.0%**

Sources: questionnaire results. Own elaboration.

Table 3. Ranges (item 23).

Discipline in Which Teachers Were Trained	*n*	Average Range
Geography	29	54.91
History	35	50.80
Art history	8	64.56
Others	24	32.04
Total	**96**	

Sources: questionnaire results. Own elaboration.

3.2. Treatment of Climate Change in School Geography Textbooks

Second, the adequacy of how the school textbooks address climate change (item 24) was analyzed. The results showed that, according to the opinions of the teachers, the way in which this phenomenon is addressed in these resources is not completely adequate. Responses with values of 1 and 2 together accounted for 44.8% (n = 43), and 38.6% responded with a value of 3 (n = 37). A finding that endorses the fact that these resources do not adequately explain this phenomenon is that none of the teachers responded with a value of 5 (Figure 1).

When analyzing these data in accordance with the discipline in which teachers were trained, for example, for the "others" group, the responses with a value of 1 are noteworthy (54.2%), which in turn coincided with those that used textbooks the least. In other words, a priori they use it very little because they consider that this phenomenon is not adequately explained. However, for the rest of the teachers, this is not the case. They do not value it highly, but continue to use it, which reveals a certain contradiction.

The Kruskal–Wallis H test was used to verify whether there were statistically significant differences between the discipline in which teachers were trained and the adequacy of the explanation of climate change in the textbooks. The test indicated that there was no significance, but only just (Kruskal–Wallis H = 7.711; p = 0.052). Table 4 indicates that the group of teachers trained in the discipline of art history showed the most significant results.

Table 4. Ranges (item 24).

Discipline in Which Teachers Were Trained	*n*	Average Range
Geography	35	53.83
History	29	49.52
Art history	8	58.50
Others	24	36.17
Total	**96**	

Sources: questionnaire results. Own elaboration.

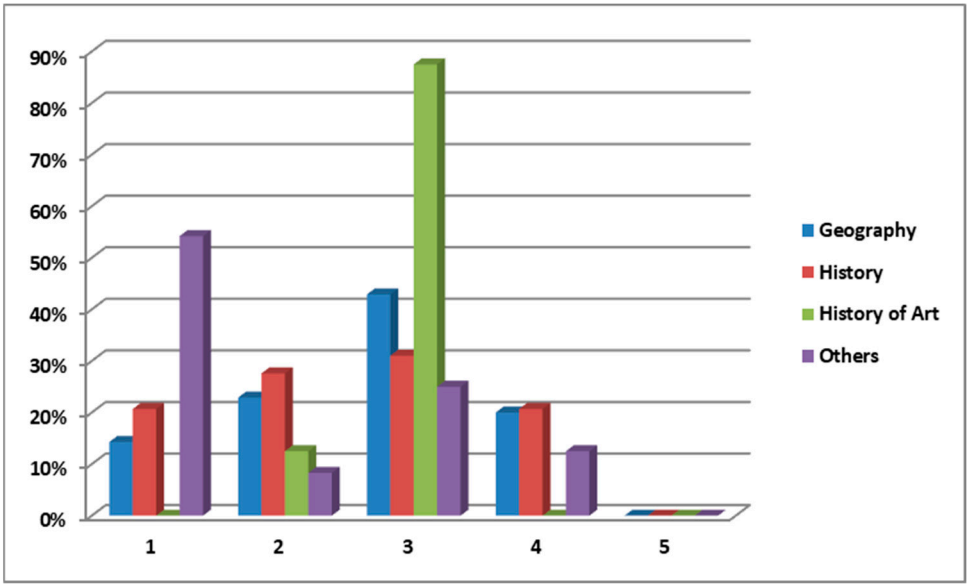

Figure 1. How adequately climate change is addressed in the geography textbook (item 24), according to the discipline in which the teachers were trained. Sources: questionnaire results. Own elaboration. Note: (1) Likert scale responses (1–5), where 1 is the most negative opinion and 5 the most positive; (2) it is worth highlighting that no teachers responded with a value of 5.

As previously mentioned, except for the "others" group, the rest show a certain contradiction between the use of the textbook and the adequacy of the contents on climate change. In order to test this relationship (item 23 and item 24), the Spearman rho test was conducted. It could be expected that an unfavorable opinion of the adequacy of these contents in the textbooks would translate into less use of these resources. However, the Spearman rho test result was $p = 0.001$ (see Table 5). Therefore, this test confirms that even though the responses of the teachers indicate that this resource does not address climate change adequately, most of them still use it.

Table 5. Correlations between items 23 and 24.

Spearman's rho	Item 23	**Correlation Coefficient**	**1.000**	**0.641 ****
		Sig. (bilateral)	.	0.001
		N	96	96
	Item 24	Correlation coefficient	0.641 **	1.000
		Sig. (bilateral)	0.001	.
		N	96	96

Sources: questionnaire results. Own elaboration. Note: ** The correlation is significant at the 0.01 level (bilateral).

3.3. Teaching of Climate Change by Schoolteachers

Third, an analysis was conducted of how climate change is being taught in school geography according to the responses of the teachers (item 25). The results revealed that two types of activities were prominent: (1) an explanation through the use of everyday cases in the environment of the student (35.4%; $n = 34$); and (2) talks and workshops carried out in class by experts (27.1%; $n = 26$) (Figure 2). The use of this latter resource indicates that teachers do not feel prepared enough. Some comments from the teachers regarding everyday activities were "reading of news stories related to the causes and consequences" (teacher 11—others), "participating in campaigns on climate change in the environment of the student" (teacher 17—geography), "studying the local climate and comparing it with previous periods and students draw their own conclusions at the end of the course" (teacher 18—geography), or "field trips to see the effects of climate change in the village of the student" (teacher 47—others). With respect to the responses on talks and workshops, some

of the teachers' responses were "workshops given by professionals" (teacher 3—others) or "attending conferences, talks and meetings on climate change" (teacher 27—history).

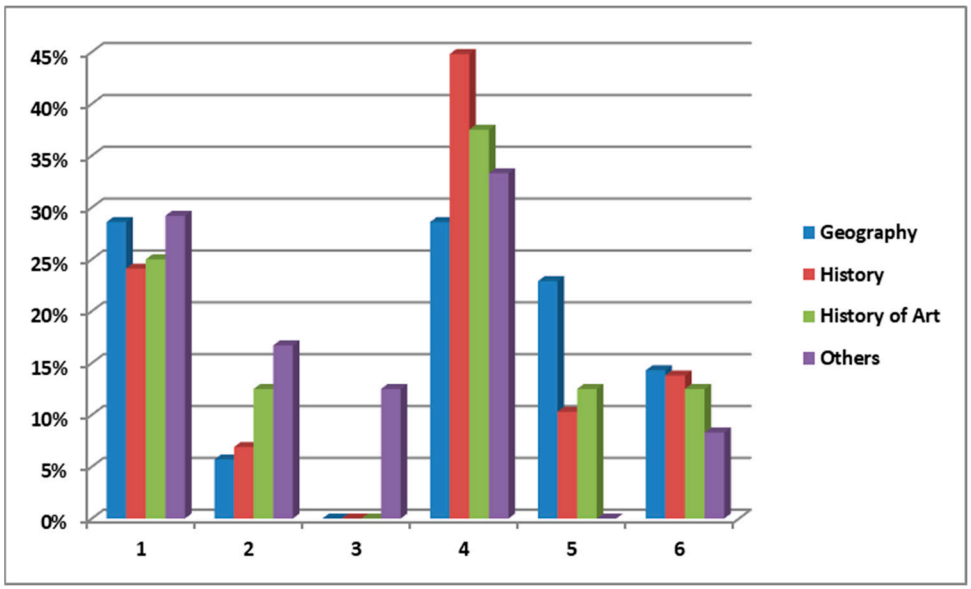

Figure 2. Responses regarding how teachers teach climate change (item 25) in accordance with the discipline in which they are trained. Sources: questionnaire results. Own elaboration. Note: codification of the responses: Talks and workshops given by experts (1); Practical exercises (2); Transversality (3); Everyday cases (4); Rigorous information (5); Do not know/No answer (6).

As Figure 2 shows, for activities that emphasize rigorous information, t the geographers accounted for 2.9%, while for the historians, the responses related to everyday cases were prominent (44.8%). In order to determine whether there was a statistically significant association with respect to the above, the chi-squared test was carried out, which showed that the association between these two variables was not significant (Pearson's chi-squared = 19.108; $p = 0.209$). Therefore, they are not associated significantly ($p > 0.05$) and the two variables are independent of one another. In other words, the discipline in which teachers were trained does not influence how they teach climate change.

The Kruskal–Wallis H test was used to verify the relationship between item 23 (textbook use) and item 25 (how the teachers teach). This indicated that there was no significant connection (Kruskal-Wallis H = 10.752; $p = 0.057$). We also analyzed whether there were statistically significant differences between the adequacy of the textbooks (item 24) and how the teachers teach (item 25). For this, the Kruskal–Wallis H test was used. This indicated that there was no significant connection (Kruskal–Wallis H = 6.922; $p = 0.226$).

Finally, the responses to item 26 ("Do you think it is worth teaching climate change in primary education, secondary education and baccalaureate classrooms?") were analyzed. This question was posed in order to learn about the opinions of active teachers regarding the teaching of contents that have become prominent in the new education law (LOMLOE) and how the respective curricula approved in 2022 incorporate them. The responses indicated that most of the participants considered that this content is interesting to teach in classrooms (89.6%; $n = 86$ responded with a value of 5). The Kruskal–Wallis H test was used to verify whether there were statistically significant differences between the disciplines in which teachers were trained. The result showed no significant difference (Kruskal–Wallis H = 6.309; $p = 0.097$).

4. Discussion

Through this research based on the opinions of teachers (secondary education and baccalaureate), the frequency of use of the school textbooks on geography, the evaluation

of how climate change is addressed in these resources, and how geography teachers teach and value these contents were analyzed.

With respect to the starting hypotheses, the first was "in relation to textbook use, most of the teachers would respond with values of 4 and 5 (Likert scale)." This study has shown that there is a variety of opinions among both those who make heavy use and little use of them. Therefore, this first hypothesis was only partly fulfilled. Moreover, it should be noted that there were statistically significant differences depending on the discipline in which teachers were trained, with teachers with an art history background making the most use of the geography manual. This could indicate that these teachers have a lower level of teacher training for geography classes as they did not receive their previous disciplinary training in geography.

These results show, once again, the low level of training in explaining climate change, as shown by other authors [37]. Different studies on social sciences [16,48] have shown how the school textbook continues to be the main or only resource used by teachers. As argued by Morote and Colomer [23], even the COVID-19 pandemic and new digital media have not led to a less use or replacement of the textbook. These authors explain that in geography textbooks, the ICT activities "are not contributing anything new to the field of education" (p. 129) and "they are simply characterized by including exercises and contents on digital platforms, but the teaching methods or approaches to problem solving are the same as in the conventional textbook. The question also arises as to whether these activities will change in the future of even how teachers are using them" (p. 129).

The second hypothesis was "in relation to the treatment of climate change in these resources, teachers would respond with values of "1" and "2" (deficient information)." This hypothesis was fulfilled. In this study, it has been shown that most teachers consider that this phenomenon is not correctly explained in the school geography textbooks. Furthermore, it has also been found that there are no statistically significant differences in terms of the discipline in which the teachers are trained. It could be expected that an unfavorable opinion of the adequacy of these contents in the textbooks would translate into less use of these resources. However, this study has shown that this was not fulfilled. In other words, even though the teachers believe that this phenomenon is not treated adequately in the textbooks, they use it as their main source of information.

The deficiencies in the treatment of climate change in the textbooks, both in primary education [17,49] and secondary education and baccalaureate [50], corroborate the results obtained in this research. For the case of the primary education phase, Morote and Olcina [49] revealed the most common errors that appear in them: (1) carbon dioxide (CO_2) appears as the main gas of the greenhouse effect, when in fact it is water vapor and (2) they replicate incorrect information that is commonly disseminated in digital media (TV, internet, social media). These media on the one hand particularly focus on the catastrophic message associated with its effects (increase in the sea level, for example), and on the other hand are replete with references related to websites for expanding knowledge or developing activities. This has been corroborated by Wu and Otsuka [51] and García-Francisco et al. [52]. Wu and Otsuka [51] indicated that when teaching this topic, it is necessary to take into account how the media influence the ideas and biases of the students and teachers. Reinforcing this idea, García-Francisco et al. [52] and Morote and Olcina [49] highlight the risk involved in using the textbook if the information contained in it or that which can be accessed on the internet is not verified. Kažys [53] also warns of the danger involved in not distinguishing unreliable and inaccurate information or the manipulation of the news [54,55]. Finally, (3) with respect to the images in the textbooks, some authors [17] have analyzed excessive extremism and catastrophism, which constitutes one of the main deficiencies.

The third hypothesis—"the contents and activities used by the teachers to explain these contents would be characterized by being activities based on talks and workshops given by professionals and activities on the analysis of the causes and consequences of climate change linked to the environment of the students"—was fulfilled. There were no statistically significant differences in terms of the training of the teachers. Therefore, the

hypothesis referring to the training of the teachers—"the geographers would stand out for teaching climate change as they would take into account the everyday situation and environment of the student"—is not confirmed.

This study has shown that there are principally two forms of teaching global warming, which coincide with two types of teachers (independently of their disciplinary training): (1) those who propose activities based on everyday examples of the student's environment (these teachers coincide with those who make less use of the textbook), and (2) those who delegate the explanation of climate change to experts. These teachers are also those who make heavier use of the textbook.

Once again, this reveals the poor preparation of teachers in how to address this phenomenon in the classroom and the use of the textbook as a main resource. These conclusions coincide with those obtained by Morote and Souto [56], who related this poor preparation with the very little training received. This means that the textbook is used as a main resource—experts are called upon or the topic is not addressed at all. There are many publications that refer to the deficient training of the teachers [57] as a result of gaps in their training [58,59] or to the fact that the teachers do not feel prepared to teach these contents [60], given the vague knowledge acquired on this topic during their education.

In order to mitigate these deficiencies, Morote and Olcina [61] identified three types of activity for teaching climate change in the textbooks. The first is related to the information sources used recommending consultation of the different international summits on climate change. The second is related to knowledge and the impacts of this process. Its objective is to propose recommendations (collective and individual) aimed at adopting more sustainable practices in the use of natural resources. The third, which would imply a more critical spirit of the students, is specific actions to combat global warming undertaken by the students. All of these proposals should on the one hand incorporate the human factor as a barely present variable when analyzing climate change, and on the other hand promote the analysis on a local and/or regional scale, as well as being original and taking into account their imagination (IOL proposals). In this way, the students will feel more involved in their learning as they form part of the area analyzed [61].

Finally, the fourth hypothesis was "in relation to the importance of teaching these contents, most of the responses will be positive." This hypothesis was fulfilled. The responses given by the teachers were notably positive (no statistically significant differences in terms of disciplinary training), which denotes that climate change is a topic of interest and importance and should be addressed at school [5,30].

5. Conclusions

This study has shed light on an advance in the knowledge of the use of the school geography textbook by teachers in today's classrooms, specifically in relation to a topical issue with a socio-territorial involvement, namely, climate change. Furthermore, there are few studies that—based on the didactics of geography—have analyzed the perspective that teachers have of school textbooks [17,61], which highlights the innovative nature of this contribution.

The results obtained reveal that the use of the textbook is uneven. Also relevant is the conclusion derived from the adequacy of how climate change is addressed in the school textbooks: the teachers negatively rate this resource. However, a high percentage of teachers still use it. This could be due to the deficient preparation received in their training on this topic [46]. This constitutes a challenge for future research. In spite of this, when analyzing how climate change is taught, hopeful opinions are found on how to address this topic, for example, teaching based on everyday cases, promoting a significant learning experience.

One limitation of this study is that the real extent of the use of the textbook by the teachers is not exactly known. This constitutes another challenge for future research. To do this, it will be necessary to interview teachers and attend their classes. On the other hand, another research challenge would be to exploit other items of the questionnaire that

would allow us to respond to the question "Are the current teachers prepared to explain this content?"

Climate change is a topical subject and has implications for society in the twenty-first century [5]. However, from an educational perspective, one challenge resides in how this training and teaching is carried out among the youngest cohorts so as to explain this global phenomenon. Improving the education and teaching of this phenomenon has become a major factor in adaptation and resilience to climate change of current and future society.

Author Contributions: Conceptualization, Á.-F.M. and M.H.-H.; methodology, Á.-F.M. and M.H.-H.; formal review, Á.-F.M. and M.H.-H.; investigation, Á.-F.M. and M.H.-H. All authors have read and agreed to the published version of the manuscript.

Funding: This research is the result of the project "Implementation and Introduction of ICT Resources for the teaching of Geography" (REDES-I3CE-2022-5692) of the University of Alicante (Spain).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Muñoz, C.; Schultz, D.; Vaughan, G. A Midlatitude Climatology and Interannual Variability of 200- and 500-hPa Cut-Off Lows. *J. Clim.* **2020**, *33*, 2.201–2.222. [CrossRef]
2. Pastor, F.; Valiente, J.J.; Khodayar, S. A Warming Mediterranean: 38 Years of Increasing Sea Surface Temperature. *Remote Sens.* **2020**, *12*, 2687. [CrossRef]
3. Romero, J.; Olcina, J. *Cambio Climático en el Mediterráneo: Procesos, Riesgos y Políticas*; Tirant Humanidades: Valencia, Spain, 2021.
4. Intergovernmental Panel on Climate Change (IPCC). Climate Change 2022: Impacts, Adaptation and Vulnerability. Available online: https://www.ipcc.ch/report/ar6/wg2/ (accessed on 19 July 2023).
5. Caride, J.A.; Meira, P.A. Educación, ética y cambio climático. *IN. ED.* **2019**, *29*, 61–76. [CrossRef]
6. Eilam, E. Climate change education: The problem with walking away from disciplines. *Stud. Sci. Educ.* **2022**, *58*, 231–264. [CrossRef]
7. Ferrari, E.; Ballegeer, A.M.; Fuertes, M.A.; Herrero, P.; Delgado, L.; Corrochano, D.; Andrés-Sánchez, S.; Bisquert, K.M.; García-Vinuesa, A.; Meira, P.; et al. Improvement on Social Representation of Climate Change through a Knowledge-Based MOOC in Spanish. *Sustainability* **2019**, *11*, 6317. [CrossRef]
8. Kurup, P.M.; Levinson, R.; Li, X. Informed-Decision Regarding Global Warming and Climate Change Among High School Students in the United Kingdom. *Can. J. Sci. Math. Technol. Educ.* **2021**, *21*, 166–185. [CrossRef]
9. Morote, Á.F.; Hernández, M. What Do School Children Know about Climate Change? A Social Sciences Approach. *Soc. Sci.* **2022**, *11*, 179. [CrossRef]
10. Morote, Á.F.; Olcina, J.; Hernández, M. Teaching Atmospheric Hazards in the Climate Change Context—Environmental Didactic Proposals in the Mediterranean Region for Secondary Schools. *Environments* **2022**, *9*, 29. [CrossRef]
11. Parks, B.; White, G. Special issue on teaching about the environment, sustainability, and climate change. *Am. J. Phys.* **2022**, *90*, 327. [CrossRef]
12. Shepardson, D.P.; Hirsch, A.S. Teaching climate change. What educators should know and can do. *Am. Educ.* **2020**, *20*, 4–13.
13. Stasewitsch, E.; Dokuka, S.; Kauffeld, S. Promoting educational innovations and change through networks between higher education teachers. *Tert. Educ. Manag.* **2022**, *28*, 61–79. [CrossRef]
14. Verlie, B.; Blom, S.M. Education in a changing climate: Reconceptualising school and classroom climate through the fiery atmosfears of Australia's Black summer. *Childr. Geogr.* **2021**, *20*, 5. [CrossRef]
15. Martínez-Fernández, L.C.; Olcina, J. La enseñanza escolar del tiempo atmosférico y del clima en España: Currículo educativo y propuestas didácticas. *An. Geo. Univ. Complut.* **2019**, *39*, 125–148. [CrossRef]
16. Bel, J.C.; Colomer, J.C.; Valls, R. Alfabetización visual y desarrollo del pensamiento histórico: Actividades con imágenes en manuales escolares. *Educ. XX1* **2019**, *22*, 353–374. [CrossRef]
17. Morote, Á.F.; Olcina, J. El tratamiento de los riesgos naturales en los libros de texto de Ciencias Sociales (Educación Primaria). Una aproximación a las definiciones y problematización de las actividades. *Cuad. Gec.* **2022**, *61*, 223–246. [CrossRef]
18. Bernate, J.A.; Fonseca, I.P. Impacto de las Tecnologías de Información y Comunicación en la educación del siglo XXI: Revisión bibliométrica. *Rev. Cienc. Soc.* **2023**, *29*, 227–242.
19. INTEF. Marco de Referencia de la Competencia Digital Docente. 2022. Available online: https://intef.es/wp-content/uploads/2022/03/MRCDD_V06B_GTTA.pdf (accessed on 19 July 2023).

20. OECD. *Using Digital Technologies for Early Education during COVID-19: OECD Report for the G20 2020 Education Working Group*; OECD Publishing: Paris, France, 2021. [CrossRef]
21. Gómez-Trigueros, I.M.; Ruiz-Bañuls, M.; Ortega-Sánchez, D. Digital Literacy of Teachers in Training: Moving from ICTs (Information and Communication Technologies) to LKTs (Learning and Knowledge Technologies). *Educ. Sci.* **2019**, *9*, 274. [CrossRef]
22. Yáñez, C.; Gómez-Trigueros, I.M. Experiencia innovadora internacional online para la introducción de la geografía y el patrimonio a través de Google EarthTM en la formación inicial del profesorado. *CIDUI*. 2021, p. 5. Available online: https://raco.cat/index.php/RevistaCIDUI/article/view/387826 (accessed on 19 July 2023).
23. Morote, A.F.; Colomer, J.C. Analysis of the activities based on ICT resources in Social Science textbooks (Primary Education): An approach to social-environmental issues. *Publ. De La Fac. De Educ. Y Humanid. Del Campus De Melilla* **2021**, *51*, 87–137. [CrossRef]
24. Sáiz, J. Actividades de libros de texto de Historia, competencias básicas y destrezas cognitivas, una difícil relación: Análisis de manuales de 1º y 2º de ESO. *Didáctica De Las Cienc. Exp. Y Soc.* **2011**, *25*, 37–64.
25. Valls, R. *La Enseñanza de la Historia y Textos Escolares*; Zorzal: Madrid, Spain, 2008.
26. Ministerio de la Presidencia, Relaciones con las Cortes y Memoria Democrática. Ley Orgánica 3/2020, de 29 de diciembre, por la que se modifica la Ley Orgánica 2/2006, de 3 de mayo, de Educación. 2022a. Available online: https://www.boe.es/buscar/act.php?id=BOE-A-2020-17264 (accessed on 19 July 2023).
27. United Nations (UN) (2015). Sustainable Development Goals. *UNDP, Sustainable Development Agenda.* 2015. Available online: https://www.undp.org/content/undp/es/home/sustainable-developmentgoals/resources.html (accessed on 19 July 2023).
28. Acuerdo de París. El Acuerdo de París. 2015. Available online: https://unfccc.int/es/process-and-meetings/the-paris-agreement/el-acuerdo-de-paris (accessed on 19 July 2023).
29. Ministerio de la Presidencia, Relaciones con las Cortes y Memoria Democrática. Ley 7/2021, de 20 de Mayo, de Cambio Climático y Transición Energética. 2022. Available online: https://www.boe.es/diario_boe/txt.php?id=BOE-A-2021-8447 (accessed on 19 July 2023).
30. Escoz-Roldán, A.; Gutiérrez-Pérez, J.; Meira-Cartea, P.Á. Water and climate change, two key objectives in the agenda 2030: Assessment of climate literacy levels and social representations in academics from three climate contexts. *Water* **2020**, *12*, 92. [CrossRef]
31. Jeong, J.S.; González-Gómez, D.; Conde-Núñez, M.C.; Sánchez-Cepeda, J.S.; Yllana-Prieto, F. Improving climate change awareness of preservice teachers (Psts) through a university science learning environment. *Educ. Scienc.* **2021**, *11*, 78. [CrossRef]
32. Masters, M. *123 Curiosidades que Todo el Mundo Debería Conocer Sobre el Clima*; Geoplaneta: Barcelona, Spain, 2020.
33. Nelles, D.; Serrer, C. *El Pequeño Manual del Cambio Climático*; Grijalbo: Barcelona, Spain, 2020.
34. Rudd, J. From Climate Change Ignorant to Climate Change Educator. *Chem.-Eur. J.* **2021**, *27*, 6107–6111. [CrossRef] [PubMed]
35. Morote, Á.-F.; Moreno, J.R. La percepción de los futuros docentes de Educación Secundaria sobre las implicaciones territoriales del cambio climático en destinos turísticos del litoral mediterráneo. *Grand Tour. Rev. De Investig. Turísticas* **2021**, *23*, 261–282.
36. León, B.; Boykoff, M.T.; Rodrigo-Jordán, C. Climate change perception among Spanish undergraduates. A reception study on the combination of the local, global, gain and loss frames. *Commun Soc.* **2021**, *34*, 57–75. [CrossRef]
37. Morote, A.F.; Hernández, M.; Olcina, J. Are Future School Teachers Qualified to Teach Flood Risk? An Approach from the Geography Discipline in the Context of Climate Change. *Sustainability* **2021**, *13*, 8560. [CrossRef]
38. Cea d'Ancona, M.A. *Metodología Cuantitativa. Estrategias y Técnicas de Investigación Social*; Síntesis: Madrid, Spain, 1998.
39. McMillan, J.H.; Schumacher, S. *Investigación Educativa*, 5th ed.; Pearson: Madrid, Spain, 2005.
40. Morote, Á.F.; Gómez-Trigueros, I.M. La brecha digital de género y enseñanza de los riesgos naturales en la formación del profesorado de Ciencias Sociales. *REALIA* **2023**, *30*, 60–75. [CrossRef]
41. Newell, R. Questionnaires. In *Researching Social Life*; Gilbert, N., Ed.; Sage: Newcastle upon Tyne, UK, 1993.
42. Sheatsley, P. Questionnaire Construction and Item Writing. In *Handbook of Survey Research*; Rossi, P., Wright, J., Anderson, A., Eds.; Academic Press: Cambridge, MA, USA, 1983.
43. Pérez-Castaños, S.; García-Santamaría, S. La investigación cuantitativa. In *¿Cómo Investigar en Didáctica de las Ciencias Sociales?* Ortega, D., Ed.; Octaedro: Barcelona, Spain, 2023; pp. 11–120.
44. Moreno-Vera, J.R.; Ponsoda-López, S.; Blanes-Mora, R. By Toutatis! *Trainee Teachers' Motivation When Using Comics to Learn History. Front. Psychol.* **2021**, *12*, 778792. [CrossRef]
45. Colás, M.P.; Buendía, L. *Investigación Educativa*; Alfar: Sevilla, Spain, 1998.
46. Morote, A.F.; Hernández, M. Water and Flood Adaptation Education: From Theory to Practice. *Water Product. J.* **2021**, *1*, 31–40. [CrossRef]
47. Gómez-Trigueros, I.M.; Yáñez, C. The digital gender gap in teacher education: The TPACK framework for the 21st century. *Eur. J. Investig. Health Psychol. Educ.* **2021**, *11*, 1333–1349. [CrossRef]
48. Rodríguez, R.R.; Simón, M.M.; Molina, S. La Región de Murcia en los manuales escolares de educación secundaria. Una narrativa a la sombra de España y Europa. *Hist. Y Mem. De La Educ.* **2017**, *6*, 241–277. [CrossRef]
49. Morote, A.F.; Olcina, J. El estudio del cambio climático en la Educación Primaria: Una exploración a partir de los manuales escolares de Ciencias Sociales de la Comunidad Valenciana. *Cuad. Gec.* **2020**, *59*, 158–177. [CrossRef]
50. Olcina, J. La enseñanza del tiempo atmosférico y del clima en los niveles educativos no universitarios. Propuestas didácticas. In *Enseñanza y Aprendizaje de la Geografía para el Siglo XXI*; Sebastiá, R., Tonda, E.M., Eds.; Servicio de Publicaciones de la Universidad de Alicante: Alicante, Spain, 2017; pp. 119–148.

51. Wu, J.; Otsuka, Y. Exploring the climate literacy of high school students for better climate change education. *Int. J. Glob. Warm.* **2021**, *23*, 151–168. [CrossRef]
52. García-Francisco, J.; Pardo, P.; Rebollo, L.F. La desertificación y otros problemas ambientales en los libros de texto de geografía de educación secundaria en España. In *Geografía, Territorio y Paisaje. El Estado de la Cuestión: Actas del XXI Congreso de Geógrafos Españoles*; Pillet, F., Cañizares, M.C., Ruiz, A., Eds.; Asociación de Geógrafos Españoles: Madrid, Spain, 2009; pp. 1.757–1.772.
53. Kažys, J. Climate change information on internet by different Baltic Sea Region languages: Risks of disinformation & misinterpretation. *J. Secur. Sustain. Issues* **2018**, *7*, 685–695. [CrossRef]
54. Brisman, A. Representing the "invisible crime" of climate change in an age of post-truth. *Theor. Criminol.* **2018**, *22*, 468–491. [CrossRef]
55. Lutzke, L.; Drummond, C.; Arvai, J. Priming critical thinking: Simple interventions limit the influence of fake news about climate change on Facebook. *Environ. Change-Hum. Policy Dimens.* **2021**, *5*, 101964. [CrossRef]
56. Morote, A.F.; Souto, X.M. Educar para convivir con el riesgo de inundación. *Estud. Geogr.* **2020**, *81*, 1–14. [CrossRef]
57. Gallego, A.P.; Castro, J.E. Estudio de las representaciones sociales de los docentes sobre el cambio climático antropogénico. *Rev. Cient.* **2020**, *38*, 229–242. [CrossRef]
58. Gilovich, T. *Convencidos pero Equivocados*; Editorial Mil razones: Madrid, Spain, 2009.
59. Sutherland, S. *Irracionalidad. El enemigo Interior*; Alianza Editorial: Madrid, Spain, 2000.
60. Morgan, A. Me as a Science Teacher': Responding to a Small Network Survey to Assist Teachers with Subject-Specific Literacy Demands in the Middle Years of Schooling. *Aust. J. Teach. Educ.* **2012**, *37*, 73–95. [CrossRef]
61. Morote, A.F.; Olcina, J. Cambio climático y sostenibilidad en la Educación Primaria. Problemática y soluciones que proponen los manuales escolares de Ciencias Sociales. *Sostenibilidad: Económica Soc. Y Ambient.* **2021**, *3*, 25–43. [CrossRef]