
Analysis of the activities based on ICT resources in Social Science textbooks (Primary Education): an approach to social-environmental issues

Análisis de actividades basadas en recursos TIC en los manuales escolares de Ciencias Sociales (Educación Primaria): una aproximación a la problemática socio-ambiental

对社会科学(小学教育)教科书中基于ICT资源活动的分析:解决社会环境问题的方法

Анализ деятельности на основе средств ИКТ в учебниках по обществознанию (начальное образование): подход к социально-экологическим проблемам

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Dates · Fechas

Received: 2021/02/03
Accepted: 2021/03/15
Published: 2021/06/30

How to Cite this Paper · Cómo citar este trabajo

Morote, A. F., & Colomer, J. C. (2021). Analysis of the activities based on ICT resources in Social Science textbooks (Primary Education): an approach to social-environmental issues. *Publicaciones*, 51(1), 113–137. <https://doi.org/10.30827/publicaciones.v51i1.20802>

Abstract

The aims of this research are to analyze the activities based on resources that use Technologies of the Information and Communication (ICT) proposed by the textbooks of Social Sciences (3rd cycle of Primary Education) in relation to the socio-environmental (weather and climate). Based on the review of the main publishers used in Spain (with special incidence in the Valencian Community), the results indicate that, of a total of 276 activities on Climatology (11.9%; n=33) are linked with ICT. In relation to the external resources, the majority are related to searching ("investigation") information from the Internet (in 5th the 65.2%, n=15; in 6th the 80.0%, n=8). Regarding the subject matter to which the contents refer, in both courses they are linked to climate change (in 5th the 30.4%, n=7; in 6th the 30.0%, n=3), and the factors and elements of the climate (in 5th the 21.7%, n=5; in 6th the 40.0%, n=4). To sum up, it should be noted that these activities are still reduced compared to the rest that are included in the manual's agenda and imitating conventional activities, so that a substantial change is not expected in the short term.

Keywords: school textbooks, atmospheric weather, climate, Social Sciences, Technologies of the Information and Communication, education.

Resumen

Los objetivos de esta investigación son analizar las actividades basadas en recursos que utilizan algún tipo de Tecnología de la Información y la Comunicación (TIC) que proponen los libros de texto de Ciencias Sociales (3^{er} ciclo de Educación Primaria) en relación a una temática socio-ambiental como es el caso del tiempo atmosférico y el clima. A partir de la revisión de las principales editoriales utilizadas en España (con especial incidencia en la Comunidad Valenciana), los principales resultados indican que, de un total de 276 actividades sobre Climatología (11.9%; n=33) se vinculan con las TIC. En relación con el recurso externo al que se vinculan, la mayoría, el 65.2% (n=15) en 5^o y el 80.0% (n=8) en 6^o tienen que ver con la búsqueda ("investigación") de información a partir de Internet. Respecto a la temática a la que hacen referencia los contenidos, estos se vinculan con el cambio climático (en 5^o el 30.4%, n=7; en 6^o el 30.0%, n=3), y los factores y elementos del clima (en 5^o el 21.7%, n=5; en 6^o el 40.0%, n=4). Como conclusión, cabe poner de manifiesto que estas actividades siguen siendo reducidas e imitando a las convencionales, por lo que no se prevé a corto plazo un cambio sustancial a la hora de enseñar los contenidos.

Palabras clave: Manuales escolares, tiempo atmosférico, clima, Tecnologías de la Información y la Comunicación, Ciencias Sociales, educación.

概要

本研究的目的是分析小学五、六年级社会科学教科书中设置的使用某种信息通信技术 (ICT) 资源的活动, 这些活动与社会-环境有关, 比如天气和气候。我们通过对西班牙主要教科书出版社, 尤其是瓦伦西亚大区出版社的的审阅, 得出以下主要结论, 在气候学的 276 项活动中, 有 11.9% (11.9%; n=33) 与 ICT 相关。关于它们所链接的外部资源, 大多数 (5 年级的 65.2%, n = 15 和 6 年级的 80.0%, n = 8) 与来自网站搜索 ("研究") 的信息有关。关于内容所指的主体, 主要与气候变化 (五年级 30.4%, n = 7; 六年级 30.0%, n = 3) 以及气候因素与要素 (五年级 21.7%, n = 5; 六年级 40.0%, n = 4) 有关。综上所述, 需要注意的是, 与教科书中的其他活动相比, 这些活动数量有限, 并且是模仿常规传统教学活动, 因此在教学内容方面预计短期内不会发生实质性变化。

关键词: 教科书, 天气, 气候, 信息通信技术, 社会科学, 教育。

Аннотация

Целью данного исследования является анализ деятельности, основанной на ресурсах, использующих тот или иной вид информационно-коммуникационных технологий (ИКТ), предложенных в учебниках по обществознанию (3-й цикл начального образования) в связи с социально-экологической темой, такой как погода и климат. На основе обзора основных издательств, используемых в Испании (с особым акцентом на Валенсийское сообщество), основные результаты показывают, что из 276 мероприятий по климатологии 11.9% (n=33) связаны с ИКТ. Что касается внешнего ресурса, с которым они связаны, то большинство, 65.2% (n=15) в 5 классе и 80.0% (n=8) в 6 классе, связаны с поиском (“исследованием”) информации в Интернете. Что касается предмета, к которому относится содержание, то он связан с изменением климата (в 5 классе 30.4%, n=7; в 6 классе 30.0%, n=3), а также с климатическими факторами и элементами (в 5 классе 21.7%, n=5; в 6 классе 40.0%, n=4). В заключение стоит отметить, что эти виды деятельности продолжают сокращаться и имитировать традиционные, так что существенного изменения в преподавании содержания в краткосрочной перспективе не предвидится.

Ключевые слова: Школьные учебники, погода, климат, информационно-коммуникационные технологии, общественные науки, образование.

Introduction

In the teaching of Social Sciences, curriculum materials (manuals, publications to support teachers, etc.), are still the predominant and central resource used in the classroom, particularly textbooks (Bel et al., 2019; Farrujía et al., 2020; López-Rodríguez, 2020; Pagès, 2008; Prats, 2012; Valls, 2007). Since the implementation of formal education systems, these materials have constituted essential elements for the teaching activity, which is also how the different publishers have understood them (Bel & Colomer, 2018). These elements have been so important that educational research has analysed them from different perspectives and textual and paratextual approaches. So much so, that a specific field of study has emerged (manualistic research) which has had a significant impact to the present day (Martínez-Bonafé & Rodríguez, 2010; Morote & Olcina, 2021).

The beginning of the gradual introduction of Information and Communication Technologies (hereafter, ICTs) in teaching environments, particularly from the 1990s, has given rise to a transformation of these materials, which are now available in digital formats and repositories that are more attractive for the students (Adell & Castañeda, 2012; Chiu, 2017; De Miguel, 2013; Ramaligela et al., 2014). The emergence of new textbook formats is changing the relationship between teachers and textbooks (Lankshear & Knobel, 2003; Minelli-De Oliveira et al., 2014) and the opinions of teachers on this digital environment are constantly changing (Minelli-De Oliveira et al., 2014; Wiley & Ash, 2005). In this respect, as indicated in previous studies (Colomer et al., 2018), this change in materials has given rise to a refocusing of teaching strategies and has therefore clearly affected the training of teachers. Examining the supply of training courses for teachers in regional and state centres (CEFIRE, CEPs, INTEF, etc.), reveals how ICTs have had a significant impact on their design.

Currently, the study of school textbooks, particularly in relation to socio-environmental topics, is not a dominant line of research in the field of Social Science, and less

so in relation to education technology (Chiu, 2017; Morote, 2020b; Ramaligela et al., 2014). This study responds to this gap in the research. That is, it takes into account the presence of activities based on ICT resources in Social Science textbooks, particularly those related to social and environmental issues, such as the weather and climate, a central aspect of Primary Education contents (Martínez-Medina & López-Fernández, 2016; Martínez-Fernández & Olcina, 2019).

The understanding and explanation of the contents under study (Climatology) are highly complex due to the different factors involved (Olcina, 2017). Even today, in the academic realm, different authors (Morote & Olcina, 2020; Olcina, 2017) indicate that it is not easy to explain climate change. Therefore, in the classroom, this content should be approached in a simple way but with scientific rigour (Martínez-Fernández & Olcina, 2019). Also in relation to climate and weather, problems can arise from very current topics such as climate change, but also from the uncertainty of the future scenarios and the increase in the intensity and frequency of extreme weather events (Intergovernmental Panel on Climate Change [IPCC], 2018). Therefore, the education factor, although underestimated when contemplated as a non-structural aspect of vital importance for climate change adaptation, should be considered as having a major role (Morote & Olcina, 2020). Furthermore, in Spain, the weather and climate have a justified place in education, as we can see in the different national and regional curricula (Martínez-Fernández & Olcina, 2019; Morote, 2020b).

In the field of Teaching of Geography, we can refer to different studies on the teaching of weather and climate (García de la Vega, 2016; Martínez-Fernández & Olcina, 2019; Martínez-Romera, 2013; Tonda & Sebastià, 2003; Morote & Moltó, 2017; Valbuena & Valverde, 2006). However, there are very few studies related to the analysis of Climatology in textbooks with a slight increase in these publications in recent years. This has been recently corroborated in the study by Morote (2020a), which analyses the current state of the research on Geography textbooks in Spain (1980-2019). With respect to the studies on climate, only nine publications have been identified (11.2%) of a total of 80 studies. These publications are, for example, those related to Primary Education (Martínez-Medina & López-Fernández, 2016; Morote, 2020b), Secondary education and Baccalaureate (Olcina, 2017), and those that address more specific matters, such as climate change in Primary Education (Arrebola & Martínez, 2017; Morote & Olcina, 2020) and Secondary education (Serantes, 2015). None of these publications have the primary objective of analysing activities that use some type of ICT resource for teaching about climate in the textbooks. Therefore, this study is of particular interest and relevance as it examines how this technology is being incorporated into the school textbooks.

Closely related to the issues of Climatology is the high level of interest in this topic emerging in recent years due to the United Nations Sustainable Development Goals (SDGs) with a decisive promotion of education in contents related to climate change and weather extremes (2030 Agenda) (Moya & Hernández, 2020). The 2030 Agenda is, to date, the greatest global commitment reached in order to protect the planet and its inhabitants and constitutes a road map made up of 17 goals with 169 targets and 232 indicators. Climate issues are included in Goal number 13 "Climate Action" ("Take urgent action to combat climate change and its impacts") which pursues the following objectives: 1) strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries; 2) integrate climate change measures into national policies, strategies and planning; 3) improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation,

impact reduction and early warning; 4) implement the commitment undertaken by developed-country parties to the United Nations Framework Convention on Climate Change to a goal of mobilizing jointly \$100 billion annually by 2020 from all sources to address the needs of developing countries in the context of meaningful mitigation actions and transparency on implementation and fully operationalize the Green Climate Fund through its capitalization as soon as possible; 5) promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities (United Nations Organization [UN], 2015).

The interest of this study is based on different dimensions: 1) Climatology is content that should be addressed in Primary Education, as established in the current curriculum (Royal Decree 126/2014); 2) in Spain, there is a scarcity of studies that analyse Geography textbooks (Social Sciences in Primary Education). This scarcity is even greater in the case of studies analysing Information and Communication Technologies (Chiu, 2017) and socio-environmental issues. We should note that there are no previous studies that analyse this relationship (Morote, 2020a); 3) the socio-environmental relevance of this topic, which is even greater if we take into account the future effects of climate change (IPCC, 2018); 4) the concern prevailing due to Social Science textbooks constituting the hegemonic resource used in classrooms (Rodríguez et al., 2017) and due to them presenting a non-interpretive view of the territory (with merely reproductive activities) (Morote, 2020b; Sáiz, 2011); 5) the lack of scientific rigour in the climate issues in textbooks (Morote & Olcina, 2020); and 6) ICTs have emerged as a new resource for teaching in recent years, but in reality the type of activities proposed, as indicated by some authors (Colomer et al., 2018) have the same function and require the same information processing tasks as those carried out in traditional formats.

In view of these interests, the fundamental research problem can be defined as: an analysis of the activities based on ICT resources in school textbooks related to a socio-environmental issue. This is necessary due to the problem of the hegemonic use of textbooks in Social Science classrooms, together with the problems specifically related to teaching of climate issues, such as the lack of scientific rigour and activities requiring a low cognitive level for their resolution. With respect to the ICTs, it is interesting to note how their use is being inserted into the school textbooks due to different reasons: 1) because they possibly reproduce the same methodology as the conventional textbook (simply changing the platform); and 2) due to the central role currently played by ICTs in teaching due to the pandemic situation (online and/or semi-attendance classes).

Based on the above, the objective of this study is to carry out an analysis of the activities based on ICT resources proposed by the Social Science textbooks (third cycle of Primary Education; Years 5 and 6) of the main publishers used in Spain (with a particular focus on the Region of Valencia). Specifically, these resources are analysed according to: 1) their place and design in the didactic unit; 2) the external resource to which they are associated; and 3) the topic they refer to. The starting hypothesis is that the ICT activities proposed in these textbooks with regard to weather and climate would be characterised by being few in number compared to the rest of the proposals for this topic. Furthermore, the cognitive strategies demanded in them would not use the potential that the technologies have to offer for working with these resources.

Sources and Methodology

The first step for conducting this study was to consult and analyse the main Social Science textbooks (third cycle of Primary Education; Years 5 and 6) used in the Region of Valencia which, in turn, coincide with the most representative publications on a national level, according to the data drawn from previous research (Bel & Colomer, 2018; Bel et al., 2019; Morote, 2020b; Morote & Olcina, 2020; Sáiz, 2011). Following the above-mentioned studies in the field, five publishers with a wide dissemination were analysed: Anaya, Bromera, Santillana, SM and Vicens Vives. As indicated by Valls (2007), they “represent 75% of the publishers used in the different Spanish autonomous regions” (p. 119) (Anaya, SM, Santillana, Vicens Vives –and also ECIR-).

The area of study is justified due to several reasons: 1) there are previous publications for the same territorial area which justify the principal publishers used, both for the analysis of History content (Bel & Colomer, 2018; Sáiz, 2011) and Geography content, specifically in relation to climate change (Morote & Olcina, 2020) and also Climatology (Morote, 2020b); and 2) there is interest in examining the contents on weather and climate in the Region of Valencia as it is considered to be one of the areas most affected by the impacts of climate change in the Mediterranean region (IPCC, 2018).

The textbooks consulted (a total of 10; two of each publisher for the complete analysis of Years 5 and 6) were published after being approved by the LOMCE (Organic Law 8/2013, of 9 December, for the improvement of the quality of education) (see Table 1). It should be noted that both the number of school textbooks and the publishers under study are representative, as highlighted by previous studies, on both a national level (Valls, 2007) and for specific regions: García-Francisco et al. (2009) for the case of ESO (Obligatory Secondary Education) (Region of Madrid) in which four publishers are used (Anaya, Santillana, SM, Vicens Vives); or the Doctoral Thesis of Sánchez-Fuster (2017) (Region of Murcia) which examines five publishers and texts, the most used in this region (Anaya, Edelvives, Santillana, SM and Vicens Vives).

Table 1

School textbooks of Social Sciences analyzed (3rd cycle of Primary Education)

Course	Book
5 th	Benítez, J. K., Cano, J. A., Fernández, E., & Marchena, C. (2014). <i>Ciencias Sociales 5</i> . Grupo Anaya. Gregori, J., & Viu, M. (2014). <i>Crónica 5. Ciencias Sociales</i> . Ediciones Bromera. García, M., & Gatell, C. (2014). <i>Sociales, 5 Educación Primaria. Aula activa</i> . Vicens Vives. Grence, T. (2015). <i>Ciencias Sociales. 5º de Primaria</i> . Santillana Voramar. Parra, E., Martín, S., Navarro, A., & López, S. (2014). <i>Ciencias Sociales. Comunitat Valenciana. 5º Primaria</i> . SM.
6 th	Benítez, K., Cano, J. A., Fernández, E., & Marchena, C. (2015). <i>Ciencias Sociales, 6: Primaria</i> . Grupo Anaya. García, M., Gatell, C., & Batet, M. (2015). <i>Sociales 6º</i> . Vicens Vives. Gregori, J., & Viu, M. (2015). <i>Ciencias sociales 6º</i> . Ediciones Bromera. Grence, T., & Gregori, I. (2015). <i>Ciencias Sociales 6º</i> . Ediciones Voramar, Santillana Educación. Martín, S., Parra, E., De la Mata, A., Hidalgo, J. M., & Moratalla, V. (2015). <i>Ciencias Sociales 6º</i> . SM.

The third cycle of Primary Education has been selected (Years 5 and 6). This is because in this cycle the cognitive level is of the highest complexity (prior to the Secondary Education stage), taking into account the age of the students (10-12 years). With respect to the contents under study, the current curriculum and its specific version for the Autonomous Region of Valencia have been taken (Decree 108/2014). In this curriculum, the content and evaluation criteria for the teaching of weather and climate are included in Social Sciences (Block 2 "The world in which we live").

The analysis of the textbooks has been carried out following the methodology outline proposed by Sáiz (2011) and which has been followed by other studies in the field of Geography (Morote, 2020b). First, the activities based on ICT resources have been analysed in accordance with their design and place within the didactic unit. To do this, three types of activity have been taken into account: Type 1) opening or initial activities; Type 2) activities related to the main body; Type 3) Final or synthesis activities; and Type 4) activities aimed at working or developing basic competences (capacity to comprehensively put the knowledge into practice and use skills and attitudes to resolve problems and situations in different contexts). As highlighted by García-Ros (2010), analysing the design of these activities enables us to gauge the extent to which learning problems are designed to organise the curricular content and to what point an appropriate didactic sequence is implemented based on an activation or pre-instructional phase (starting with the prior conceptions of the students), an instructional or development phase and a final feedback phase.

Second, the activities have been selected in accordance with the external resources to which they are associated. Taking into account the content under study, the external resources that are proposed in the textbooks have been categorised into: Internet, virtual textbook (cd that accompanies the school textbook), television and the use of photographs. Third, the activities have been analysed according to the topics that the content refers to: factors and elements of climate, climate change, extreme weather phenomena, the impact that climate has on human activities and the environment, biographies of climatologists, final self-evaluation of the didactic unit, weather prediction and climate NGOs.

Annexes I and II at the end of this study include all of the activities based on ICT resources identified in the school textbooks. These annexes also specify the topic that the activities refer to (3rd objective), thereby facilitating the reading and comprehension of the information gathered for the reader.

Analysis and Results

Type of activities based on ICT resources in accordance with their design and place within the didactic unit

The analysis of activities based on ICT resources proposed in the Primary Education (3rd cycle) Social Science textbooks on Climatology content, reveals that they are in a minority with respect to the conventional resources. Of the 276 activities identified, only 11.9% (n=33) are related to ICTs. In Year 5, this content is included in specific didactic units on climate with a total number of activities that fluctuates between 32 in the publications of Anaya and Bromera and 67 in that of Santillana. However, the percentage of those related to ICTs in relation to the total varies between 18.8% (n=6)

in Bromera and 6.2% (n=2) in Anaya (Table 2). In the case of Year 6 of Primary Education, as opposed to the previous year, except for the Bromera textbook, in the rest of the publications, the didactic units are not entirely dedicated to Climatology, but contemplate transversal topics and differ between publishers, such as hydrography, landscape, vegetation or the physical environment. Although the Bromera textbook has the highest number of activities (n=42), those related to the new technologies only account for 4.7% (n=2). Vicens Vives does not include any ICT-based activities, while in Anaya and Santillana they represent 40.0% (n=2) respectively.

Table 2

Title dedicated to the didactic units where contents on Climatology are inserted in the school textbooks of Social Sciences (3rd cycle of Primary Education)

Course	Editorial	Title of the units	Total n° of activities	N° of activities based on ICT resources
5 th	Anaya	Unit 4. The climate	32	(6.3%; n=2)
	Bromera	Unit 2. Climate and landscape	32	(18.8%; n=6)
	Santillana	Unit 4. The atmosphere and weather	57	(8.8%; n=5)
	SM	Unit 2. The climate	51	(13.7%; n=7)
	Vicens Vives	Unit 3. Climate and vegetation	44	(6.8%; n=3)
6 th	Anaya	Unit 2. The hydrography and climate	5	(40.0%; n=2)
	Bromera	Unit 2. The climate and vegetation	42	(2.3%; n=2)
	Santillana	Unit 2. Water and the climates of Europe and Spain	5	(40.0%; n=2)
	SM	Unit 1. The landscapes of Spain	4	(100.0%; n=4)
	Vicens Vives	Unit 2. The physical environment of Spain	4	(0.0%; n=0)

With regard to the design and place of the activities based on ICT resources in Year 5, a total of 23 have been identified. The majority (60.9%; n=14) are related to the development of basic competences (see Table 3). By way of example, the Santillana publication proposes a total of four activities of these characteristics; for example: "Investigate in what other places in Europe we can find the climates of Spain. Are there any European climates that are not found in Spain?" (Grence, 2015, p. 71). The student must research and learn, on the one hand, about the climates of Spain and whether similar climates can be found in the rest of Europe, and on the other hand, different climates to those found in Spain. Therefore, it is an activity in which students should understand the climate characteristics of Spain and know how to compare them with the rest of the European climates.

Table 3

Activities based on ICT resources according to the design and location in the units of the Social Sciences school textbooks (3rd cycle of Primary Education)

Editorial and course	Opening	Linked to the main body of the UD	Synthesis	Development of basic skills	Total
Anaya 5 th	2	-	-	-	2
Anaya 6 th	-	1	1	-	2
Bromera 5 th	-	1	-	5	6
Bromera 6 th	-	1	1	-	2
Santillana 5 th	-	1	-	4	5
Santillana 6 th	-	-	2	-	2
SM 5 th	-	2	1	4	7
SM 6 th	-	1	1	2	4
Vicens Vives 5 th	-	1	1	1	3
Vicens Vives 6 th	-	-	-	-	-

In the case of Year 6 textbooks, as there are a lower number of activities (n=10), conclusions as clear as those found for Year 5 cannot be obtained (see Table 3). For this year, for example, one of the synthesis activities proposed by the publisher SM is the preparation of a presentation on a protected natural space about which the students have to find information on the Internet, including maps, climographs, photographs, etc., and prepare a leaflet with all of the information and a slide presentation: "Organise yourselves into small groups, prepare a presentation on a protected natural space in Spain for a television programme: 1) find maps, climographs, infographs, photographs, etc., in the official pages of this protected space; 2) prepare a leaflet with all of the information and a slide presentation; 3) present all of the spaces investigated to the class as if it were a television programme" (Martín et al., 2015, p. 31).

External resources to which the ICT activities are associated

In Year 5, the majority of the external resources to which the ICT activities are associated are related to information searching activities ("research") on the Internet (65.2%; n=15), and a minority of resources related to consulting the electronic textbook (CD that accompanies the book or searching for information on the television or photographs online (ver Figure 1). For example, in Anaya the activities proposed for the use of the Internet are: "Find out the meaning of the words in bold (climate change, greenhouse effect, global warming)" and "search for news about the latest floods, hurricanes or storms and talk about them in class with your classmates" (Benítez et al., 2014, p. 52). In the Bromera textbook, all of the activities based on ICT resources are also related to the search for information (100.0%; n=6) such as, for example: "search

for information on the Internet about tourism in Europe and indicate which countries receive the most tourists. Is climate a fundamental factor?" (Gregori & Viu, 2014, p. 29); "search for information about the *cold front* and write a definition in your own words" (Gregori & Viu, 2014, p. 30); or the search for information about meteorological devices and their inventors (see Figure 2).

Figure 1

Resources to which the ICT activities of the Social Sciences textbooks are linked (3rd cycle of Primary Education)

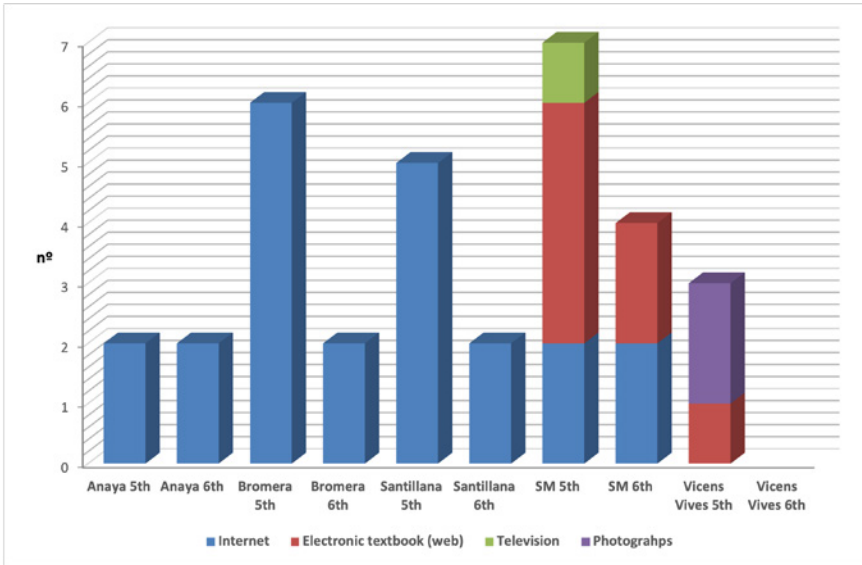


Figure 2

Example of activity about the search for information on the internet

1. Aquests científics han inventat alguns aparells meteorològics. Investiga i escriu una biografia breu de cadascun, amb el nom de l'aparell que inventaren i la utilitat.

Robert Hooke Gabriel Fahrenheit Guillaumé Amontons Evangelista Torricelli

Note. Taken from *Crónica 5. Ciencias Sociales*, by J. Gregori & M. Viu, 2014, Ediciones Bromera.

Santillana includes 5 activities related to searching for information and research and, particularly, the causes and consequences of climate change and the proposal of actions to resolve this socio-environmental problem by the students (see Annex I). This

textbook also includes an activity to analyse the climate characteristics on a local scale: "Use ICTs. Use the website of the *Agencia Estatal de Meteorología* (State Meteorology Agency) (www.aemet.es) and consult the minimum and maximum temperatures of your town for a week and plot them on a graph" (Grence, 2015, p. 71) (see Figure 3). However, we should note that this activity is complex and limited as the measurements of the different climate elements are not recorded by the AEMET for all towns, as its observatories are located in the main towns or strategic infrastructures such as ports or airports.


Figure 3

Example of activity based on ICT resource about the search information on climatic characteristics on a local scale

Demuestra tu talento

Elige y realiza una de estas actividades:

- A. USA LAS TIC.** Consulta en la página web de la Agencia Estatal de Meteorología (www.aemet.es) las temperaturas mínimas y máximas de tu municipio durante una semana y regístralas en un gráfico.
- B.** Averigua qué es el efecto invernadero y explica en tu cuaderno qué lo causa y cuáles son sus consecuencias. Puedes hacer un dibujo explicativo.
- C.** Investiga en qué otros lugares de Europa se dan los climas de España. ¿Hay algún clima europeo que no se dé en España?



Note. Taken from *Ciencias Sociales. 5º de Primaria*, by T. Grence, 2015, Santillana Voramar.

As opposed to the books of the other publishers, in the SM textbook the activities related to resources for consulting the digital manual are more prominent (n=4) (smSabadigital.com). For example: "Play and learn". Where is there more atmospheric pressure, in the mountains or on the coast? Justify your answer" (Parra et al., 2014, p. 29); and "Practice". "Stop climate change" (Parra et al., 2014, p. 37) (activity about actions to reduce the effects of climate change) and "evaluate what you have learnt" (Parra et al., 2014, p. 39). The latter is a self-evaluation exercised based on a questionnaire. This publisher also includes an activity involving consulting and following up information on the television: "observe the weather forecast on the television tonight. What does it predict for tomorrow? Check to see whether it is right" (Parra et al., 2014, p. 40). Finally, there are two activities involving the use of the Internet. By way of example: "Find out the altitude of the highest town in Spain. What will be the temperature if the is 24°C on the coast? (Parra et al., 2014, p. 31). This is a research exercise which requires the students to carry out a mathematical operation so as to calculate the reduction in the thermal gradient in accordance with the increase in altitude (decrease of 6°C for every 100 m increase in altitude).

The last manual to be analysed for Year 5 of Primary Education is that of the publisher Vicens Vives. There are 3 ICT activities related to three types of information: 1) the search for photographs on the Internet ("divide the class into four groups. Each group must find photographs of plant species characteristic of each area of vegetation of Spain. Share your work, select the best photos and make a mural with the material collected" (García & Gatell, 2014, p. 50); 2) activities with the electronic textbook "explorador@digital. Video on climate change". This activity consists in watching and

exploring the causes and consequences of climate change; and 3) taking photographs. This is a photographic competition in which the students take photos of their local surroundings and analyse the changes that take place throughout the four seasons of the year in order to see the impacts of climate. In this respect (García & Gatell, 2014):

Go for a walk with your family and take different photos that feature the climate and its effects. The photos can be general or detailed, but you should take them from an artistic point of view. Photograph vegetation, meteorological phenomena or their effects, rural and even urban landscapes, etc. Choose one and give it an original title. Share it with your classmates and upload it to the server that you usually use (Picasa, Dropbox, etc.) (p. 55).

This is the only activity of this kind proposed in all of the Primary Education Social Science textbooks analysed (Years 5 and 6).

Figure 4

Activity based on ICT resources that are related to the search of information on the internet

Demuestra el teu talent

Tria i realitza una d'aquestes activitats.

A. TREBALL COOPERATIU. Joga amb els companys i companyes a *Afluents que comencen per la lletra...* Es tracta d'escriure noms d'afluents que comencen per una determinada lletra i el nom del riu principal a què pertanyen. Hi guanya el qui escriga abans el nom dels dos rius. Per exemple: «Afluent que comence per G: *Gállego* ► *Ebre*».

B. USA LES TIC. Consulta en Internet una pàgina sobre l'oratge a Europa i durant una setmana anota les temperatures de les capitals europees.

C. EDUCACIÓ CÍVICA. Esbrina què és el protocol de Kyoto, què s'hi pretén aconseguir i si Espanya l'ha signat.

Note. Taken from *Ciencias Sociales 6º*, by T. Grence, & I. Gregori, 2015, Ediciones Voramar, Santillana Educación.

In the case of Year 6, similarly to Year 5, of a total of 10 ICT activities, 80% (n=8) are related to resources that involve the searching for information on the Internet (see Annex II). The only two activities proposed by the Anaya publication are related to these types of resources: "In small groups, search for information on mild climates" (Benítez et al., 2015, p. 24) and "research and find information about the dominant climates in Morocco, the United States and China" (Benítez et al., 2015, p. 31). The Bromera textbook includes an activity that requires students to: "Research and find out what permafrost is. Then, prepare a presentation to explain it in class" (Gregori & Viu, 2015, p. 28). The two activities proposed in the Santillana publication are: "Use ICTs. Consult a website about the weather in Europe and for one week note down the temperatures of the European capitals" and "civil education. Find out what the Kyoto Protocol is, what it seeks to achieve and whether Spain has signed it" (Grence & Gregori, 2015, p. 45) (see Figure 4). Finally, in the SM textbook, there are four ICT activities, 50% (n=2)

are related to the electronic textbook: “smSabadigital.com. Practice”. What characteristics do Spain’s climates have?” and “self-assessment activity” (Martín et al., 2015, p. 29). The other two activities are related to the search for information on the Internet (see Figure 5). In these activities, the students have to prepare a presentation about a protected natural space in Spain and one of the methodological steps is the search for information based on maps, climographs, photographs, etc.

Figure 5

Activity based on ICT resources related to the search of information on the internet

Tasca final Un programa de turisme natural

Organitzats en grups reduïts, prepareu una presentació sobre un espai natural protegit d'Espanya per a un programa de televisió.

1 Busqueu mapes, climogrames, infografies, fotografies, etc. en les pàgines oficials d'aquest espai protegit.

2 Prepareu un fullet amb tota la informació i una presentació de diapositives per a projectar.

3 Presenteu davant de la classe la informació de tots els espais treballats com si fóra un programa de televisió.

smSabadigital.com
VALORA EL QUE HAS APRES Com has treballat en aquesta tasca?

31

Note. Taken from *Ciencias Sociales 6º*, by S. Martín, E. Parra, A. De la Mata, J. M. Hidalgo, & V. Moratalla, 2015, SM.

Principal topics to which the content of the ICT activities refer

In the case of Year 5 of Primary Education the ICT-based activities in the Social Science textbooks refer to three main topics of the contents under study. The first two are those related to climate change (30.4%; n=7) and the influence of the climate on human activities and the environment (26.1%; n=6) (see Figure 6). Climate change is a topic addressed by all of the publishers, such as, for example, Santillana: “Find out what the greenhouse effect is and in your notebook explain what causes it and its consequences. You can draw an explanatory diagram” (Grence, 2015, p. 71), or “search for information about the causes of climate change and complete this table with four of these reasons” (Grence, 2015, p. 68) (see Figure 7). Meanwhile, for the influence of climate, the Bromera textbook stands out with the proposal of 2 activities on this topic. By way of example: “search for information on the Internet about tourism in Europe and indicate which countries receive the most tourists. Is climate a fundamental factor?” (Gregori & Viu, 2014, p. 29). Third, also noteworthy are the activities that refer to climate factors and elements (21.7%; n=5). For example, the publisher SM proposes several activities for measuring temperature: “Find out the altitude of the highest town in Spain. What will be the temperature if the is 24°C on the coast?” (Parra et al., 2014, p. 31).

Figure 6

Activities based on ICT resources according to the subject to which they refer (5th and 6th of Primary Education)

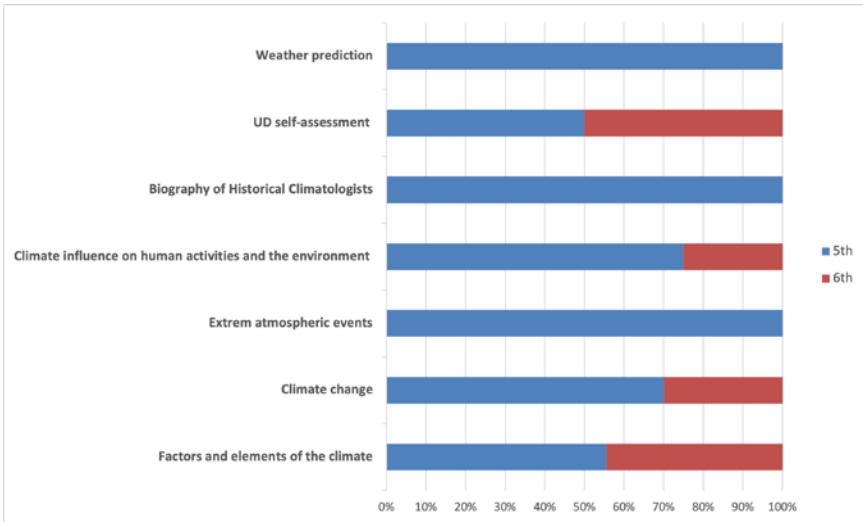


Figure 7

Example of an activity based on ICT resources about the search of information on the causes and consequences of climate change

Proponer acciones para combatir el cambio climático

El cambio climático es uno de los grandes retos a los que se enfrenta actualmente la humanidad. Por ello, es importante que tomemos medidas para frenarlo.

El primer paso para combatir un problema es conocer sus causas. Después, hay que analizar qué medidas se pueden tomar para reducir cada una de las causas que provocan el problema.

→ **Analiza las causas.**

1 USA LAS TIC. Busca información sobre las causas del cambio climático y completa este cuadro con cuatro de esos motivos. Puedes consultar estas páginas web:

- www.inspiration.org/cambio-climatico
- www.eitb.eus/multimedia/infografias/infografia-multimedia/cambio-climatico/definicion.html

Causas del cambio climático

✓

Note. Taken from *Ciencias Sociales. 5º de Primaria*, by T. Grence, 2015, Santillana Voramar.

In the case of Year 6 of Primary Education, although the ICT-based activities proposed for Climatology are less prominent and have less weight than those of Year 5, we can also observe that the two main topics are the factors and elements of climate (40.0%; n=4) and climate change (30.0%; n=3). By way of example, the Bromera school textbook proposes the following with respect to climate change: “Find and list at least five

international summits on climate change” (Gregori & Viu, 2015, p. 33). Meanwhile, in relation to factors and elements of climate, Anaya proposes an activity for researching the climate characteristics of different countries: “research and find information about the dominant types of climate in Morocco, the United States and China” (Benítez et al., 2015, p. 31).

Discussion and Conclusions

This paper seeks to determine the current state of the activities based on ICT resources that are included in Social Science textbooks (3rd cycle of Primary Education) related to relevant socio-environmental aspects, such as Climatology. With respect to the starting hypothesis, we have been able to confirm that there is only a small number of these activities compared with the conventional exercises proposed in the textbooks analysed. With regard to the type of activity, the majority are characterised by being related to external resources, in this case, with the search for information on the Internet; this requires very basic cognitive strategies to resolve. Furthermore, this study furthers the manualistic research in geographic content related to social and environmental problems in Spain, as indicated by Olcina (2017). Moreover, this contribution is highly relevant as these studies (related to Climatology) are still scarce in comparison with other areas of Geography Teaching. This was noted by Morote (2020a) for the territorial scope of Spain, where there are only 80 studies on the analysis of Geography textbooks, but those related to the object of study (Climatology) represent just 11.2% of these (n=9).

With regard to the design and place of the activities based on ICT resources, this study shows, with the exception of Year 6 as the number of activities (n=10) does not allow us to establish clear conclusions, that in Year 5, the majority (60.9%; n=14) seek to develop basic competencies. These results may be corroborated with those of other studies (Morote, 2020b) which confirm that the majority of activities are related to the principal body of the didactic unit: in Year 5 of Primary Education 48.6% (n=105); 57.6% in Year 6 (n=34).

With respect to activities based on ICT resources, the results reveal that what the majority of them do is merely change the platform (analogical to digital). For example, the use of the Internet as a source of information or the digital book in which both the contents and the activities are the same, with no changes to the methodology or teaching strategies (abuse of literal copying of content from the Internet and no reflection on the contents of different virtual information sources) (Gonçalves & De Almeida, 2016). Some activities proposed in the textbooks analysed, while in the minority, follow the line suggested by Martínez-Fernández and Olcina (2019), with the proposal of organising students into small groups and the configuration of an ICT product based on a relevant social and environmental problem. This is the case of the activity proposed by SM (Year 6): “Organise yourselves into small groups, prepare a presentation on a protected natural space in Spain for a television programme” (see Annex II). Undoubtedly, this activity would help the learner to understand the environment of a space (in this case, a natural space), searching for information, etc.

Contrary to other studies, for example, Morote (2020b) finds how in Year 5 of Primary Education, the textbook resources with respect to weather and climate are related to textual resources (50.9%; n=110) (in Year 6 this percentage is 71.9%; n=41). A lower percentages are related to iconic-based resources (19.4%; n=42), combined resources

(15.2%; n=33), and the remaining 14.3% (n=31) correspond to external resources (consultation of websites, blogs, etc.). A case mentioned by this author is the example of the publisher Santillana which relates 17.5% of the total activities (n=10) to external resources characterised by the search for information through ICTs (use of the Internet).

Martínez-Medina and López-Fernández (2016) explain that the activities proposed in the textbooks (topic on Climatology) usually involve the interpretation of climographs or the description of photos of the typical vegetation of a climate. Other studies on school Social Science textbooks (Years 5 and 6 of Primary Education) (Sáiz & Colomer, 2014), reveal that they particularly promote activities in which the principal resource is the text of the authors. However, there are very few activities that refer to the use of external resources as shown in this study. As explained by Pozuelos and Romero (2002), this indicates that the activities analysed are inflexible and tend to be closely tied to the curriculum on which they are based, especially with respect to the issues that are fundamental for the critical development of the students. In the case of Spain, according to the ideas of Martínez-Fernández and Olcina (2019), the textbook is the essential ally for teaching these socio-environmental issues. As indicated by Martínez-Medina and López-Fernández (2016), their value resides in the development of the contents to be taught, in the use of texts, tables, graphs, maps, photographs or illustrative diagrams which facilitate the understanding of these contents and, of course, the type of activities used.

Primary sources should have greater relevance due to their undeniable educational potential in being able to explain cases of extreme weather events, news, studies carried out, etc. In this way, the learners can see the usefulness of this branch of Geography. In this respect, the British organisation, the Geographical Association, has been addressing climate elements in Primary Education for decades, with teaching proposals, case studies and the analysis of academic research in order to educate students in current socio-environmental issues (the case of climate change) (Owens, 2018; Spear, 2018). Along these lines, Sáiz and Colomer (2014) observe that the activities that use external resources or arouse debate and open questions are those that require a higher cognitive level and, therefore, lead to a greater development of competencies.

In terms of the teaching of climate change, recent studies have analysed the deficiencies and merits in Primary Education textbooks (Social Sciences). For example, for the case of the use of images, Morote and Olcina (2020) explain that the majority of the illustrations are excessively catastrophic when explaining the content on this phenomenon. This can be observed in Figure 7 (an illustration of the “drowning” planet earth). Also regarding the images, in relation to the explanation of the risk of drought in Spain, Morote (2021), found that a total of 7 images, 57.1% (n=4) appear for merely aesthetic reasons, and the majority are characterised by an abuse of the catastrophic message. Furthermore, sometimes photographs are included of other territories or out of context, having little to do with the drought in Spain.

With regard to the contents, Martínez-Fernández and Olcina (2019) explain that the following should be taken into account: 1) their correct treatment (definition of the concepts, interpretation the mechanisms and explanation of the processes to be learned, using the most appropriate terminology and simple language); 2) the selection of images and illustrations with significant teaching value (sky, clouds, relevant weather phenomena, meteorological data collection and measurement devices, landscapes associated with the different types of climate, etc. and 3) an abundance and correct construction of tables and, fundamentally graphs and maps. These authors also explain that the textbooks used considerably limit the access to the enormous

volume of information or graphic and cartographic documentation with which to go deeper in the active teaching of the contents on Climatology. They also point out that another resource being implemented in the classroom is the use of ICTs and web resources. However, as we have seen in this study, their use is still only marginal.

One limitation of this study is that, although these types of study can provide a picture of what happens in the classrooms (Valls, 2007), it is necessary to explore the real use made by the teachers of these tools. However, their analysis is highly important due to the relevance of textbooks in schools. In this respect, Rodríguez et al. (2017) explain that school textbooks continue to have an omniscient role in teaching and this will not change with the introduction of new digital media. And for the case of teaching Climatology, it should be emphasised that the textbook is still the principal resource, although, as indicated by Martínez-Fernández and Olcina (2019), another resource being increasingly implemented in the classrooms is the use of ICTs and web resources. But, as revealed in this study, their use is still very limited, at least in the Primary Education textbooks. This is highly important because, as we have seen with the current pandemic, ICT resources are necessary to adjust and adapt to online teaching and/or semi-attendance learning which has been dominant since 2020. This is something that will not change in the short to medium term, and it seems as though this situation is here to stay. Therefore, teachers and specifically publishers are faced with a significant challenge, namely: to adapt the new technological needs of the current world in order to help students acquire certain competencies and work with the content of the subjects in a comprehensive way.

As a positive aspect, although still in a minority, are the activities that involve researching, contrasting and interpreting information based on different sources which gives rise to new opportunities to integrate digital technology into the classrooms. To do this, further research is required with respect to these tools, taking into account the many resources that they include as this would also be useful for moving away from the traditional research methods that have characterised the teaching of Social Sciences in Spain (Miralles et al., 2011).

To conclude, after analysing the activities based on ICT resources, it can be confirmed that they are not contributing anything new to the field of education, as also concluded by Chiu (2017). They are simply characterised 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 or even how teachers are using them. In this respect, studies have been conducted both in Spain (Moreno & Vera, 2017) and on the international arena (Ramigela et al., 2014) analysing the reticence of teachers to use the new technologies in the classroom. Therefore, the question would be whether the incorporation of new teachers would improve the increase in the use of these activities and how they are approached. These latter questions will be the short-term challenges of future research in order to continue exploring the teaching of Geography in schools in relation to socio-environmental issues in textbooks.

Acknowledgement

This research is part of the results of the project "Social representations of school content in the development of teaching skills" (PGC2018-094491-B-C32) funded by the Ministry of Science, Innovation and Universities and co-financed with EU ERDF funds.

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Annex

Annex I

Activities based on ICT resources and subject of the contents that are referred to the exercises about search of information on the Internet in the school textbooks of Social Sciences (5th of Primary Education)

Book	Activities	Subject
Anaya 5 th	-“Find out the meaning of the highlighted words (climate change, greenhouse effect, global warming)” (Benítez et al., 2014, p. 52).	Climate change
	-“Look for news of the latest floods, hurricanes or storms and discuss them in class with your classmates” (Benítez et al., 2014, p. 52).	Extrem atmospheric phenomena
Bromera 5 th	-“Search in the internet data on tourism about Europe and indicate which countries receive the most tourists. Is the climate a fundamental factor?” (Gregori and Viu, 2014, p. 29).	Climate influence on human activities and the environment
	-“In which contries mainly the agriculture is concentrated? Why?”(Gregori and Viu, 2014, p. 29).	Climate influence on human activities and the environment
	-“Look for information about cold front and write down the definition in your words” (Gregori and Viu, 2014, p. 30).	Extrem atmospheric phenomena
	-“Look for more information and list the causes and consequences of climate change” (Gregori and Viu, 2014, p. 31).	Climate change
	-“Countries are also concerned about the problem and come together to reduce greenhouse gas emissions. One of these attempts was the Kyoto meeting (1997) and later the 17 th Climate Change Conference in Durban (2011). Research these acts and write a short report” (Gregori and Viu, 2014, p. 31).	Climate change
	-“These scientists have invented some meteorological devices. Research and write a brief biography of each one, with the name of the device they invented and the utility” (Gregori and Viu, 2014, p. 33).	Biography of Historical Climatologists

Book	Activities	Subject
Santillana 5 th	-“Use ICT. Look for images of three plants that grow in areas with an oceanic climate” (Grence, 2015, p. 65).	Climate influence on human activities and the environment
	-“Find information on the causes of climate change and complete this table with four of those reasons” (Grence, 2015, p. 68).	Climate change
	-“Use ICT. Check on the website of the State Meteorological Agency (www.aemet.es) the minimum and maximum temperatures in your municipality for a week and record them in a graph” (Grence, 2015, p. 71).	Factors and elements of the climate
	-“Find out what the greenhouse effect is and explain in your notebook what causes it and what its consequences are. You can make an explanatory drawing” (Grence, 2015, p. 71).	Climate change
	-“Find out where else in Europe the climates of Spain occur. Is there a European climate that does not occur in Spain?” (Grence, 2015, p. 71).	Factors and elements of the climate
SM 5 th	-(digital book): “Play and learn”. Where is there more atmospheric pressure, in the mountains or on the coast? Justify the answer” (Parra et al., 2014, p. 29),	Factors and elements of the climate
	-“Investigate at what altitude is the highest municipality in Spain. What temperature will it be if it is 24°C on the coast?” (Parra et al., 2014, p. 31).	Factors and elements of the climate
	-(digital book): “If it is 29°C on the beach and 9°C on the top of a mountain, how tall is the mountain? (Parra et al., 2014, p. 31).	Factors and elements of the climate
	-“How do animals adapt to the climate? Research an animal from the desert and one from the polar zone and present your conclusions to the class. Do not forget to contribute photos or videos” (Parra et al., 2014, p. 33).	Climate influence on human activities and the environment
	-(digital book): “Practice”. “Stop climate change” (Parra et al., 2014, p. 37).	Climate change
	-(digital book): “Value what you have learned” (Parra et al., 2014, p. 39). The latter is a self-assessment (questionnaire).	UD self-assessment
	-“Watch the weather forecast on TV tonight. What do you predict for tomorrow? Check if they get it right” (Parra et al., 2014, p. 40).	Weather prediction

Book	Activities	Subject
Vicens Vives 5 th	<p>-“Dividid la clase en cuatro grupos. Cada grupo debe buscar fotografías de las especies vegetales características de cada área de vegetación de España. Poned en común vuestro trabajo, seleccionad las mejores fotos y elaborad un mural con el material recopilado” (García & Gatell, 2014, p. 50).</p> <p>-(digital book): explorador@digital. Video of climate change (García & Gatell, 2014, p. 53).</p> <p>- “Go for a walk with your family and take different photographs that have the weather and its effects as protagonists. The photos can be general or detailed, but you must take them from an artistic point of view. Photograph vegetation, meteorological phenomena or their effects, rural and even urban landscapes, etc. Choose one of them and give it an original title. Share it with your colleagues by uploading it to the server you normally use (Picasa, Dropbox, etc.)” (García & Gatell, 2014, p. 55).</p>	<p>Climate influence on human activities and the environment</p> <p>Climate change</p> <p>Climate influence on human activities and the environment</p>

Note. in 5th of Primary Education a total of 23 ICT activities have been identified

Annex II

Activities based on ICT resources and subject of the contents that are referred to the exercises about search of information on the Internet in the school textbooks of Social Sciences (6th of Primary Education)

Publisher	Activities	Subject
Anaya 6 th	-“In small groups, find information about hot climates” (Benítez et al., 2015, p. 24).	Factors and elements of the climate
	-“Research and find information on the dominant climate types in Morocco, the United States, and China” (Benítez et al., 2015, p. 31).	Factors and elements of the climate
Bromera 6 th	-“Research and guess what permafrost is. Then prepare a presentation to explain it in class” (Gregori & Viu, 2014, p. 28).	Climate influence on human activities and the environment
	-“Research and cite at least five international conferences on climate change” (Gregori & Viu, 2014, p. 33).	Climate change
Santillana 6 th	-“Use ICT. Consult a page on the Internet about the weather in Europe and for a week note the temperatures of the European capitals” (Grence & Gregori, 2015, p. 45).	Factors and elements of the climate
	-“Civic education. Guess what the Kyoto Protocol is, what it is trying to achieve and if Spain has signed it (Grence & Gregori, 2015, p. 45).	Climate change
SM 6 th	-(digital book): “Practice. What are the characteristics of the climates in Spain?” (Martín et al., 2015, p. 25).	Factors and elements of the climate
	-(digital book): “Self-assessment activity” (Martín et al., 2015, p. 29).	UD self-assessment
	-“Find information about the United Nations conferences for the protection of the environment. What objectives do they pursue? Has Spain participated?” (Martín et al., 2015, p. 30).	Climate change
	- “Organize yourself in small groups, prepare a presentation about a protected natural area in Spain for a television program: 1) look for maps, weather charts, infographics, photographs, etc., on the official pages of this protected area; 2) prepare a brochure with all the information and a slide presentation to project; 3) present in front of the class the information of all the spaces worked as if it were a television program” (Martín et al., 2015, p. 31).	Climate influence on human activities and the environment

Note. In 6th of Primary Education a total of 10 ICT activities have been identified. The publisher Vicens Vives does not provide activities based on ICT resources