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Education on climate risks and their implications for health

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Abstract

The paper presents a descriptive study that analyzes the relationship between science and common culture in the social representations of problems arising from climate change, stressing the importance of promoting adequate communication and education on climate risks and their implications for health. The global climate change on Earth due to natural and anthropogenic causes that occurs at different time scales is a matter of controversy among scientists, policy makers and especially among ordinary citizens who are informed, generally, for the most common means of communication, creating a common culture in relation to this aspect that reveals very interesting facts about what is meant and is known for Climate Change and the consequences that such knowledge can lead to mitigate or otherwise increase. The construction of the common culture on climate change and the problems that entails is comprised of different construction way scientific element; so that knowledge of the common culture on Climate Change can improve education and communication about the threat of it to health.

The study was conducted from the selection of a significant sample of 512 university students taking as independent variables the branch of knowledge and the course. Has been used as a tool for data collection a questionnaire with 45 questions of closed type, of which the first 32 questions are made with the intention of assessing students' knowledge regarding Climate Change and the remaining 13 questions are related personal and subjective aspects.

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1. Theoretical background

Social Representations are cognitive systems that have a logic and own language, are not just "opinions about", "images of" or "attitudes to" if not theories sui generis intended to discover reality and their management (Moscovici, 1969). Social Representations include value systems, ideas and behaviors with the dual function of: 1) to establish guidelines that allow individuals the opportunity to orient themselves in their social environment and material, 2) to secure group communication, providing code to interpret, naming and classifying, univocally, different aspect of the world. Obviously, all this is conditioned by cultural and personal aspects of each group and individual (García, 1990). In the case of Social Representations on Climate Change (SRCC) interest focuses on analyzing how scientific representation of a phenomenon, Climate Change, originally built in a field of external interpretation to the world of everyday life, be objective, be accommodates and is anchored in the system of representations of common culture (Meira & Arto, 2014). The SRCC are built with concepts, theories and other elements that come from the scientific culture; and by transposition and anchoring processes are combined with other elements of the common culture as beliefs or experiences to objectify and legitimize. The interest of these representations not is whether the knowledge of people in relation to a scientific object is correct or not, but seeks to understand the lines open for the common know about that object (in this case Climate Change), how it evolves and what can be their valuation and pragmatic implications (Smith & Joffe, 2012).

Studies on social representations in relation to environmental issues are abundant, highlight the Ecobarómetros that the Junta de Andalucía has been doing for years now, studies of the CIS or the Ministry of Environment as is the case study " Actitudes y percepción del medio ambiente en la Juventud española "(Oliver, Castells, Casero, & Morey, 2005) or research reports from non-governmental or private entities such as the Report " Conciencia y Conducta medioambiental en España "of the BBVA Foundation in 2006, but nevertheless, the climate change is a hot topic analyzed and studied in relation to its causes, impacts, etc., example of which are the reports of the Intergovernmental Panel on Climate Change (IPCC) among others, but little analyzed in the public opinion research, as is the case of said. Still, research based on social representations referring to climate change begin gradually to become hollow in the areas of environmental analysis, and specifically, the most relevant studies of the Spanish geography are framed in the research project RESCLIMA.

It is from this research project where different demoscopic waves trying to publicize the social representation as analytical and explanatory reference with the intention of linking human thought and understanding with the individual and social development so arise that interactions of the day to day based on common knowledge without need of the scientific knowledge. The most relevant studies in this respect have been research within the framework of environmental education with the Spanish population as an object of study and analysis, example is the title " Comunicar el Cambio Climático. Escenario social y líneas de actuación "(Meira, 2009)," Medios de comunicación y Cambio Climático "(Fernandez & Mancinas, 2013)," La sociedad ante el Cambio Climático. Conocimientos, valoraciones y comportamientos en la población española "(Meira, Arto, Heras, & Montero, 2011). Other background of this study is " Representaciones del cambio climático en estudiantes universitarios en España: aportes para la educación y la comunicación " of (Meira & Arto, 2014) framed in the project RESCLIMA too. Thanks to these publications are generating a series of reports that reveal and explore what it tastes, thinks and does the Spanish population with regard to climate change, in both the personal and collective sphere. On the other hand, this publications exploring what is expected and demanded of the government and question what aspects there is willingness to change lifestyles with the intention of once recognized and accepted personal and collective responsibility for the problem, progress in the search for global solutions.

2. Problem, objectives and hypotheses

The construction of the common culture about climate change is understood differently as a scientific element, so that knowledge of the common culture about Climate Change can improve education and communication on the threat thereof for the health. That's why the importance of analyzing the perception of the university students to know what is the future trend to change attitudes and / or values as the risks that climate change may pose for the health and deficiencies or potential that the Environmental education and communication have for this field.

The objectives that give meaning to this research are:

- To evaluate the knowledge and beliefs of university students about the causes, consequences and solutions of climate change.
- To compare if the academic formation obtained in different branches of knowledge, degree and academic course influences in the social representations of climate change.
- To describe how the university students perceive the risk from climate change

To characterize what kind of information on climate change has a greater influence on the social representations of this phenomenon in college students

So, in this study the following hypotheses are proposed:

- Null hypothesis (H0): "the knowledge of the climate science in the course, degree, and branch of university students surveyed, influences in the social representations that are being generated on Climate Change and its consequences for health. "
- Alternative hypothesis (H1): " the knowledge of the climate science in the course, degree, and branch of university students surveyed, it does not influence in the social representations that are being generated on Climate Change and its consequences for health."

3. Methodology

The context in which this study falls is in the public institution University of Granada (Spain), specifically, have been determined as object of study students of first and fourth academic year 2014/2015, although exceptionally have been taken samples of students in the third course, for a total sample of 512 students. Degrees have been selected from the various branches of knowledge and the percentage is shown in the following tables:

Table 1. Percentage of respondents per branch knowledge and percentage of respondents per degree.

Branch knowledge	% Survey respondent	Degree	% Survey respondent
Pure Sciences	35,7	Enviromental Sciences	11
Social Sciences	31,9	Biology	20,5
Health Science	14,1	Sociology	12,7
Engineering	9,4	Business Management	19,1
Humanities	9	Speech Therapy	14,1
		Civil Engineering	9,4
		Traslation and interpretation	9

The selection was made based on natural groups, attempted to obtain a significant sample balancing the number of students per class and degree. The 55.8% of survey respondents are first year and the 44.2% of fourth grade. The 88.2% of students surveyed are framed in the range of 18 to 23 years, with the total, 36.8% men and 63.2% women.

For this study, we have opted for a model of research in survey of opinion public. The questionnaire consists of 32 questions that assess the knowledge that the individual has on Climate Change. It is a quantitative study type because responses can be measured by the frequency of responses and allows comparisons. It has been used as a tool for collecting data a questionnaire "ad hoc", created for this analysis specifically, consisting in 45 questions of closed type, of which the first 32 questions are made with the intention of assessing the knowledge in Climate Change and the remaining 13 questions are related to personal and subjective aspects. The reliability of this data collection instrument has been calculated by the method of reliability coefficient Cronbach's alpha, which has resulted in 0.67, which means that the questionnaire has acceptable reliability as data collection instrument.

Data analysis was conducted based on the calculation of descriptive statistics of frequency, mean, mode and variance. Next the result in% was represented along with histogram graphics to represent the frequency response and provide an insight into the tendency of individuals surveyed in the questions.

Later the Anova analysis of a factor was used to compare various groups in the independent variables, and finally the Post-hoc Tukey test was done to give greater accuracy to the previous analysis and to generate an analysis of multiple comparisons for obtain statistically significant differences (degree of significance, $\chi^2 = p < .05$)

Table 2. Hypothesis testing using ANOVA.

Item (with the most chosen option)	Median	Degree of Significance (Degree/ Course/ Branch knowledge)
El efecto invernadero es un fenómeno natural TV	2,36	0.00/0.41/0.00
Un planeta más cálido ampliará el área de incidencia de las enfermedades tropicales PV	1,98	0.00/0.28/0.04
El incremento de las temperaturas favorecerá la ocurrencia de fenómenos atmosféricos extremos (ciclones, huracanes, inundaciones, etc.) PV	1,69	0.05/0.45/0.46
El agujero polar del ozono provoca el deshielo de los polos TV	1,64	0.33/0.05/0.13
Si dejamos de emitir gases de efecto invernadero no nos afectará el cambio climático PV	2,89	0.00/0.11/0.00
Los cánceres de piel se incrementarán como resultado del cambio climático PV	1,90	0.00/0.19/0.00
La lluvia ácida es una de las causas del cambio climático PV	2,18	0.01/0.78/0.05
La mayor parte de los gases de efecto invernadero presentes en la atmósfera provienen de fuentes naturales PF	2,90	0.11/0.17/0.27
El CO2 es el principal gas responsable del cambio climático TV	2,02	0.010/0.03/0.00
Todos los países sufrirán el cambio climático TV	1,48	0.06/0.06/0.12
El incremento en el consumo de carne contribuye al cambio climático PV	2,79	0.00/0.74/0.00
De no ser por el efecto invernadero no existiría la vida tal y como la conocemos TV	2,22	0.00/0.30/0.00
Cada vez que se utiliza carbón, petróleo o gas contribuimos al cambio climático TV	1,66	0.02/0.17/0.01
El efecto invernadero pone en riesgo la vida en la Tierra TV	1,92	0.00/0.02/0.00
El cambio climático aumentará el número de terremotos y tsunamis PV	2,02	0.00/0.93/0.00
El cambio climático es consecuencia del agujero en la capa de ozono PV	2,22	0.00/0.08/0.00
El cambio climático está ocasionado por la actividad humana PV	1,86	0.19/0.61/0.09
El cambio climático es el resultado de la variabilidad climática natural PV	2,54	0.06/0.09/0.01
El efecto invernadero se produce cuando los gases retienen parte de la radiación reflejada por la superficie terrestre TV	1,67	0.00/0.94/0.00
El nivel del mar está aumentando debido a la dilatación del agua por el ascenso de las temperaturas PV	2,24	0.02/0.02/0.00
El cambio climático disminuirá la pluviosidad en mi país PV	2,33	0.70/0.33/0.72
La subida de las temperaturas afectará a todas las regiones del planeta por igual PF	2,81	0.00/0.06/0.00
El CO2 es un componente natural de la atmósfera PV	1,58	0.00/0.92/0.00
Si dejamos de emitir gases de efecto invernadero seremos menos vulnerables al cambio climático PV	1,99	0.21/0.14/0.62
El cambio climático agudizará los problemas de desertificación en la Península Ibérica PV	1,76	0.08/0.86/0.156

El cambio climático se reduciría si plantásemos más árboles PV	2,16	0.12/0.81/0.40
El CO2 provoca la destrucción de la capa de ozono PV	2,10	0.00/0.05/0.00
Existe consenso científico al considerar la actividad humana como causa principal del cambio climático PV	1,91	0.78/0.02/0.642
Según el historial climático de la Tierra, se han producido oscilaciones entre períodos más fríos y más cálidos TV	1,47	0.00/0.12/0.00
Muchas islas y zonas costeras quedarán sumergidas debido al cambio climático TV	1,57	0.22/0.02/0.79
El efecto invernadero está ocasionado por la actividad humana PV	2,16	0.00/0.15/0.00
Sustituir el transporte privado por el público es una de las medidas más eficaces para afrontar el cambio climático PV	1,92	0.14/0.02/0.14

4. Discussion of results

According to the results, almost 100% of respondents know the phenomenon of climate change and believes that now is happening with a degree of security in that statement quite high. They have very general knowledge on Climate Change, and not being precise knowledge of climate science contradict certain ideas and generate negative perception of certain atmospheric phenomenon essential for the live such as the greenhouse effect. The perception of the impact of climate change globally, in our country and individually, show a fairly similar level of agreement among all respondents perceived these consequences reaching as possible in the future. The reviews of that climate change is happening mainly for human causes and perception of the scientific consensus is fairly equal between those who think that this agreement is low and those who believe the opposite. The perception of individual responsibility and the responsibility of Spain in the causes of climate change stands at a medium level.

The degree of information on climate change is low both in general issues, causes and control measures as consequences, and the vast majority claims to have received little information on the degree studied and claims not to have received specific training, so would confirm the alternative hypothesis. In analysing the independent variables (branch of knowledge, qualifications and course) there are significant differences, being the branch of Pure Sciences which major differences generated with respect to the others, probably because in these degrees are studied, among other things, functioning of natural systems, the physical aspects of reality, so that as the climate change phenomenon is framed in climate science and therefore a physical phenomenon, students in these disciplines can have more knowledge on this subject others from other branches. Specifically, students of Environmental Sciences are those most significant differences are the other qualifications, because this type of student is characterized by receiving a multidisciplinary training aimed to know the relationship of human beings to each other and the environment which it is part so that they can come to understand the reasons for environmental degradation and obtain solutions to mitigate. Therefore, it is reasonable to think that these students have different perceptions to rest because they encompass different disciplines and may have more knowledge to understand the causes and consequences of climate change. On the other hand, there are also significant differences between courses 1st and 4th, specifically these differences are framed within aspects of climate and atmospheric knowledge so we could think that these differences come from the level of knowledge that is gained along the training of the degree of a student. Similarly, we must add that the perception of Climate Change has analysed not too far to the perception of people who have participated in other Public opinion.

5. Conclusion

The analysis of the above results shows that the vast majority of respondents know the phenomenon of climate change, and almost all of them, believe that today is happening this phenomenon with a degree of security in the fairly high affirmation. On the other hand, it can be concluded that the students surveyed at the University of Granada have

very general knowledge on climate change, so that, not being precise knowledge of climate science contradict certain ideas and generate a negative perception of certain essential for life atmospheric phenomena such as the greenhouse effect. In addition, perceptions regarding the impact of climate change globally and individually in our country, show a fairly similar level of agreement among all respondents perceived these consequences reaching as possible in the future. It is also recallable that in a large number of respondents, opinions on that climate change is happening mainly for human causes and perceptions about the scientific consensus in this regard is also similar, is fairly even between those who think that such an agreement is low and those who think otherwise. On the other hand, the perception of responsibility for the causes of climate change is also similar because the vast majority of students in this study put the individual responsibility and Spain at a medium level.

The degree of information of the sampled population on the phenomenon of climate change, denotes a low level both in general issues, causes and control measures as consequences, in addition, respondents mostly say they have received little information on this phenomenon in the qualification and that claim also not received specific training in this subject so these results confirm the alternative hypothesis of this study, so that the information received in the different branches of knowledge and, therefore, different degrees and courses not influence social representations that are currently being generated on Climate Change. However, when analysing the data by independent variables such as the branch of knowledge, qualifications and course can be seen that there are significant differences between them, being the branch of pure science which major differences generated with respect to the other branches, and in reference to the degree, it may indicate that studies in Environmental Sciences are the most prominent in terms of differences between groups of qualifications is concerned. This can be explained because in pure science calls are studied among other things, the functioning of natural systems, the physical aspects of reality, so that, as the climate change phenomenon framing in climate science and therefore a physical phenomenon, students in these disciplines can have more knowledge on this subject than students from other branches of knowledge.

In the case of the biggest differences between students of Environmental Sciences with regard to students from other surveyed qualifications it can indicate specifically students of this science are characterized by receiving a multidisciplinary training which aims to understand the relationships of human beings between itself and the middle part, so that they can come to understand the reasons for environmental degradation and obtain solutions to mitigate or avoid it. In this sense, it is reasonable to think that these students have different perceptions to other students and that by adopting such a view covering the different disciplines may have more knowledge interrelated in understanding the causes and consequences of climate change. On the other hand, the differences between courses first and fourth are basically in areas that fall more in climate and atmospheric knowledge so you can understand that these differences are possibly related by the level of knowledge to be getting along student training.

In general, the perception of Climate Change has been analysed in this study not too far to the perception of people who have participated in other Public opinion polls, although you can see some differences on specific questions that leave understand the influence of the territory and even other variables such as political level or age, variables among others that have been measured but not analysed and related to the rest of the items on the questionnaire in this study, making a detailed analysis of different socio-demographic variables can be of great interest to know better perceptions of climate change in this group.

According to these findings, the perception of Climate Change is not directly related to the academic training of college student, so it is interesting to consider how knowledge of this phenomenon and where forms appropriate information, so that by answering these questions changes in attitudes, values and perceptions of climate change and its health risks can be feasible and generated from formal educational institutions or not to create socially and environmentally responsible individuals.

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