A MOOC on climate change mitigation and adaptation for Spanish primary and secondary teachers: education as a tool for increased action by Spanish-speaking students worldwide

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Abstract

Education capacity building and awareness have been identified as major tools towards mitigation, adaptation and building climate change resilience. There are three big problems in the education of the science of climate change in the Spanish language (of which there are 477 million native speakers): lack of high quality resources in Spanish, the material related to mechanisms of climate change in the curricula of climate change is not connected with socio-economic aspects, and a gap between hard science and classroom contents. In this project, we propose to elaborate a massive open online course (MOOC) in Spanish to explain the main factors of climate change to primary and secondary teachers, in order to help them to participate in the debate on how to mitigate and adapt to climate change, and pass on this knowledge to learners.

Keywords: *Education, Primary school, Secondary school, MOOC, Knowledge*

Introduction

Adaptation, according to Intergovernmental Panel on Climate Change (IPCC, 2014), is "*the process of adjustment to actual or expected climate and its effects*". This adjustment should be in terms of ecological, social and economic structures and should be a response of expected changes in the climate and their impacts in order to take advantage of new opportunities (Adger et al., 2005). Education capacity building and awareness have been identified as major tools towards mitigation, adaptation and building climate change resilience (UNFCC, 2007). Lyth et al. (2007) said that the objectives of education are to increase knowledge of the context and the science of climate change and to educate about its potential mitigation. The education on climate change will develop the critical skills necessary to understand climate change (Lyth et al., 2007), increase the ability of individuals or groups to adapt to climate change and to implement the adaptation decisions (Davidson & Lyth, 2012). Education on climate change adaptation and mitigation in primary and secondary schools the world over is needed to mobilise society towards this planetary issue.

In our work as teachers of Didactics of Natural Sciences, we have identified an important lack of high quality, evidence-based educational resources about this matter in the Spanish, a language spoken by 477 million native speakers. Parallel to this finding we observed that the curriculum for Natural Sciences usually contains material related to the physical mechanisms changing the climate, but

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there is no discussion connecting them to the actual situation of the planet. Finally, we found a gap between hard climate change science and classroom contents.

In order to solve these three big problems for Spanish students, in this project we propose to elaborate a massive open-access online course (MOOC) in Spanish to explain the causes and the effects of climate change to primary and secondary teachers.

MOOCs are designed to allow for unlimited participation responding to an important social demand in specialized matters (in our case climate change). Students could be located in different spaces and work at different times, allowing them to study independently and without following a schedule. MOOCs favor the development of new didactics resources and provide interactive elements that ensure the interaction among participants and with the teachers, encouraging collaboration among them. Via MOOC learning, learners play a more important role in their own education and self-evaluation (Kaplan and Haenlein, 2016; Valverde Berrocoso, 2014). These characteristics make such kinds of courses appropriate and attractive for many people, helping to raise awareness and capacity about climate change in society.

Methodology

The MOOC was produced keeping in mind the contents of Natural Sciences from the Spanish public education curricula. We highlight the global aspects of the problem and encourage the discussion between Spanish speaking students all over the globe.

The methodology that we propose for this project is made of four well defined stages:

i) **Diagnostic**: the MOOC is designed around the principles of evidence-based facts, scientific rigor and actuality.
ii) **Content design**: aligned with the consensus emanated from the IPCC and public education curricula.
iii) **Content creation**: high quality videos, figures, graphs and other didactic resources which could be used by teachers in their classrooms.
iv) **Delivery and evaluation of the impact**: using big data analysis to precisely measure the reach of our material and establish a good estimation of the impact of our project.

Finally, the MOOC is based in the following principles: It is written in a positive narrative by a multidisciplinary team, including experts in Science Education, Biology, Chemistry, Didactics, Geology, Mathematics and Physics; the course is built over the scientific consensus (IPCC), avoiding controversy; and focus on primary and secondary teachers, but not only. The MOOC will be offered by the platform Miríadax (https://miriadax.net/home).

Results

The selected contents of the MOOC are:

- The causes of the climate change: the science, physics and chemistry, behind them.
- The consequences of the climate change and how scientists can predict the near future.

- The solutions and strategies that can be implemented and how education can help.
- Resilience, and how to promote climate resilient development.
- Vulnerability, and how to reduce the vulnerability of the communities in the face of an uncertain future.
- Competences in the field of mitigation and adaptation.

These contents were organised in seven modules:

- Module 0: Welcome.
- Module 1: A changing climate - A scientific perspective.
- Module 2: Evidences of climate change.
- Module 3: Mechanisms of climate change.
- Module 4: Human activity as a cause of climate change.
- Module 5: Future scenarios
- Module 6: What we can do from education?

Conclusions

This project aims to provide high quality information to Spanish-speaking teachers to help them to participate in the debate on how to mitigate and adapt to climate change through education and awareness. Additionally, by preparing teachers, schools and communities will be better equipped to face natural hazards and reduce disaster risk. This project will help to mobilise society through education, and due to increased knowledge about climate change, the project will also help to create a new positive narrative around young climate leaders that convey urgency and hope, away from pessimism, and through to imperative action.

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