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Climate Change and Health as Massive Open Online Courses

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Abstract. To teach the basics of climate change and health - such as the nature of health impacts, best practices in adoption strategies and promotion in health co-benefits, mitigation and adaptation strategies - we have developed three massive open online courses (MOOCs). We analysed the three MOOCs with regards to different factors such as course content, student motivation, instructor behaviour, co-learner effects, design and implementation effects. We conducted online surveys for all three MOOCs based on the research model of Hone et al., extended with regards to student's motivation and course outcomes. In total, we evaluated 6898 students, of which 101 students took part in the online survey. We found differences in completion rates and country of origin for the three MOOCs. The francophone MOOC was found to have a high number of participants from lower-income- and low-and-middle-income countries. The majority of participants were aged between 22 and 40 years of age and had mainly a graduate educational background. The primary motivation to join the MOOC was the knowledge and skills gained as a result of taking the course. The three MOOCs on climate change and health had a reach of almost 7000 students worldwide, as compared to the scope of a face-to-face course on the same topic of 30 students, including students from resource-low environments that are already vulnerable to current changes in climate. The evaluation of the MOOCs outlined the current impact. However, further research has to be conducted to be able to get insights into the impact over time.

Keywords. MOOC, Climate Change, Health, Africa, Global Education

Introduction

Climate-related extremes such as floods, droughts, heat waves and cyclones [1] are in the centre of public focus. To confront climate change, over 190 countries meet for the 23rd UN Climate Change Conference (COP) to discuss and negotiate agreements that have led already to binding obligations, such as the Kyoto protocol and the Paris agreement. However, as Liyanagunawardena et al. [2] state "health literacy […] is of critical importance for everyday life". Especially with regards to climate change and health, there is an urgent need for meaningful information, particularly on the local level to be able to create awareness, capacity, as well as local action regarding climate change, to lead on decision-making and to establish active public processes [3].

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Climate change has many and significant impacts on health and should be fundamental to climate policy [4], as it affects, amongst others, non-communicable diseases (such as respiratory and cardiovascular diseases), the global distribution of vector-borne diseases (such as dengue and chikungunya virus vectors)[5], malnutrition due to variability in rainfall leading to floods and droughts [6], raising sea-levels destroying infrastructure. With the three massive open online courses, we want to open the arguments and rationale of climate change and its impact on health to the general public, to policy-makers and to vulnerable populations especially in Africa, as well as to communicate best practices in adaptation strategies and in the promotion of health co-benefits [7]. As a mean to reach a global audience and even potential researchers, MOOCs are a grand opportunity, especially given today's ubiquitous technological environment. MOOCs not only have been shown to have a massive global reach - some of the most successful MOOCs had a total enrollment of over 1 million students [8, 9] – but provide means to reliable information that can reach and empower people otherwise left out [2]. In one MOOC, students were reached that outperformed students were participating in the MOOC of one of the most prestigious US university. The development of MOOCs predominantly is done by developed countries; there is a lack of MOOC development from resource-low countries [2]. In cooperation, we have developed three MOOCs about climate change and health: one targeted at a general audience, the other for a general francophone audience with a focus on Africa developed with our partners from the Centre de Recherche en Santé (CRSN) in Nouna in Burkina Faso, and a short and concise MOOC targeted at policy-makers.

To learn about the impact of the three MOOCs, we have analysed them with regards to several factors and want to present and discuss in this paper the students' demographics, concluding with recommendations.

1. Methods

Participants of the three MOOCs were invited to participate in an online survey[2] that compromised 50 question items for the general MOOC on climate change and health (MOOC-CCH), 54 question items for the francophone MOOC with a focus on Africa (MOOC-CCS), and 53 question items for the MOOC for policy-makers (MOOC-CCHPM). The questions were adapted to the context of the respective MOOC and followed the research model based on Hone et al. [10].

Question items included free text questions, yes/no-questions, and questions following a five-point Likert scale. We extended the research model proposed by Hone et al. with (4) perceived usefulness (extrinsic) (H6) and user satisfaction (H7), also described in the model of K.M. Alraimi et al. [11]. The respective learning platforms of the MOOCs provided information on student's demographics (age, country of origin), as well as course participation and completion rates. The MOOC-CCH and MOOC-CCHPM were published on the learning platform iversity[3] based in Germany; the francophone MOOC-CCS was made available on the FUN-MOOC[4] learning platform, based in France.

[2] https://www.surveymonkey.net
[3] https://iversity.org
[4] https://www.fun-mooc.fr

2. Results

In total, 6895 participants were registered in all three MOOCs, of which 186 participated in the survey. The country of origin varied depending on the respective learning platform: on the German-based platform iversity, we found a prevailing number of German participants, mainly from higher income countries, whereas on the French-based platform FUN-MOOC we found a varied francophone audience from France but also from other francophone low-resource East African countries (see Figure 1, Figure 2). The predominant age group for all three MOOCs was between 31 and 40 years of age. The retention rate of MOOC participants varied between 1% for MOOC-CCH, 20% MOOC-CCHPM and 9% for MOOC-CCS. For the two English MOOCs, most participants progressed less than 5% of the total course contents. Between 5-80% of the course content was completed by around 10% of MOOC participants, and about 13% progressed more than 80% of course contents.

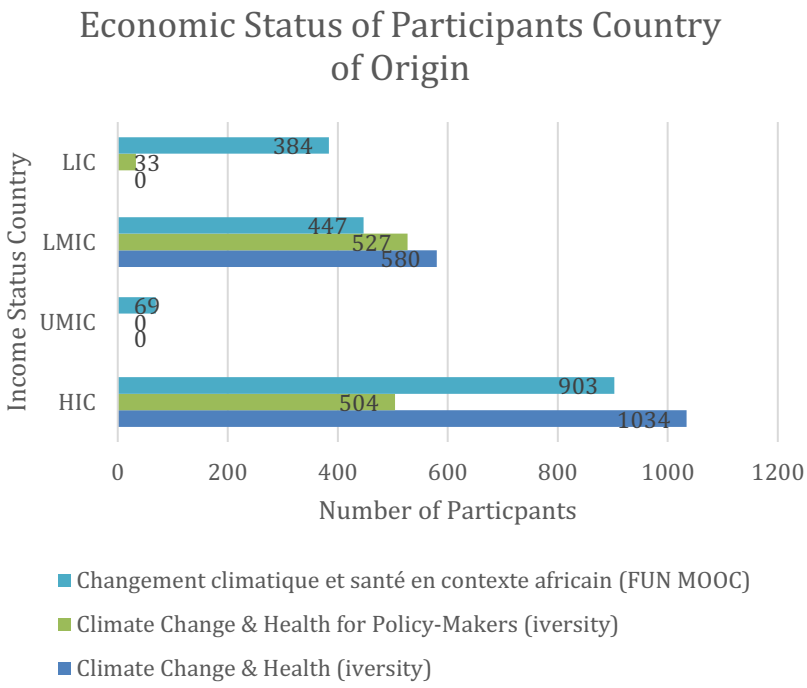

Figure 1. Economic status of participants' country of origin for the three different MOOCs on Climate Change and Health.

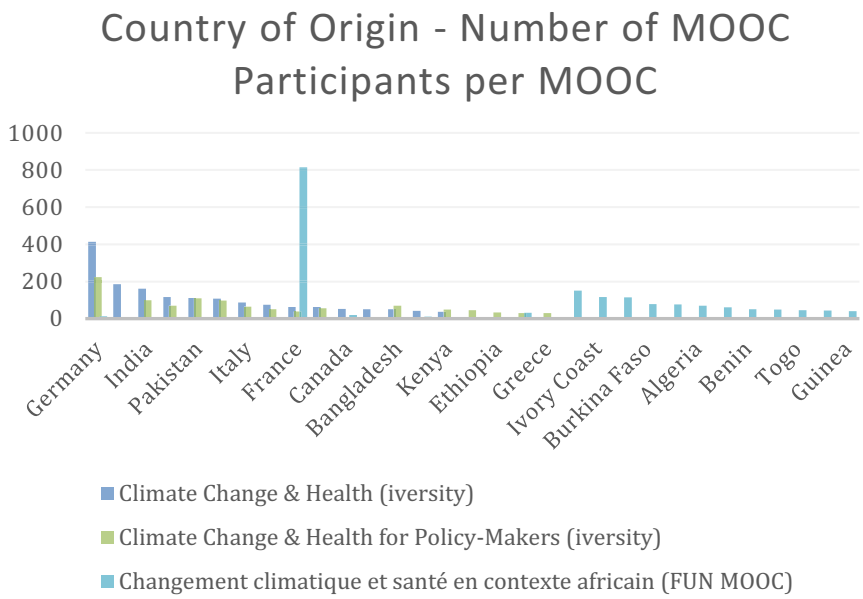

Figure 2. Overview of the MOOC course participants country of origin.

3. Discussion

There is a dire need to include health impacts in the debate of climate change on a global level. MOOCs offer great potential and could, therefore, strengthen teaching and engaging a more significant global population within the topic of climate change and health. Three MOOCs have been published that focus on climate change and health for different audiences: at English and French-speaking audiences and policy-makers. The country of origin of the learning platform has shown to define the range of MOOC participants: although the MOOCs attracted an international crowd in general, for the German iversity platform, there were predominantly German and English-speaking participants, and for the French FUN-MOOC platform there were mostly participants from French-speaking communities, including West-African countries. The low completion rate of the three MOOCs (1% for MOOC-CCH, 20% MOOC-CCHPM, 9% MOOC-CCS) is in line with other MOOCs, as not all participants aspire for certificates and may benefit from the MOOC despite not finishing the full course. MOOCs are made for a global audience. However, our results show that there is need to define target audiences and adapt the MOOC according to participants and their cultural context.

Although there is a need to understand the impact of MOOCs thoroughly, it is evident that the reach of participants of the three MOOCs out passes the reach of presence courses: For the three MOOCs, the reach covered in total almost 7.000 students as compared to a two-week presence-course with a potential reach of 25 students per course. The design and production of the MOOC involve a commitment regarding time, finances and professional expertise. MOOCs offer a global reach which can be a driver for climate change education, enabling higher accessibility into the rationale between climate change and health and make it available to people that have been outside the reach of

other teaching endeavours, such as presence courses. With the expansion of mobile data networks and the decrease in prices for these mobile services, also low and lower-middle income countries can access quality resources such as MOOCs.

4. Conclusion

MOOCs are still very popular [12], which as we have found with the three MOOCs on climate change and health is a chance for opening climate change education and making arguments and state-of-the-art knowledge available to a diverse global audience, fostering discussions and change in terms of adaptation and mitigation of climate change especially with a focus on health.

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