**Raising awareness about food security using a massive open online course**

Carly J. Stevens\*, Rebecca Whittle, William J. Davies, Jane E. Taylor

Lancaster Environment Centre, Lancaster University, Lancaster, LA1 4YQ.

\*Correspondence: c.stevens@lancaster.ac.uk

**Societal impact statement**

Addressing global food security is one of the greatest challenges facing humankind today but finding ways to discuss this complex topic can be difficult. Finding solutions may require interaction between a range of actors, including academics from varying disciplines, policy makers and NGOs, companies, farmers and the public. In order to go some way to addressing the need for increased public engagement we put together an eight-week massive open online course (MOOC) on the e-learning platform FutureLearn. We show that online courses have the potential to broaden and facilitate conversations in ways which create possibilities for new forms of understanding.

**Keywords**

Global food security, e-learning, MOOC, environmental sustainability

Achieving greater global food security is one of the greatest challenges facing us today. There are currently 820 million people globally without enough food (Willett *et al.*, 2019) but there are also large sectors of the population who eat too much poor quality food. At the same time, production of food is putting our environment under severe stress contributing to a wide range of environmental problems including land use change, soil degradation, pollution, climate change and biodiversity loss. Recent high profile publications (e.g. Godfray *et al.*, 2010; Godfray *et al.*, 2018; Willett *et al.*, 2019) have drawn attention to the widespread prevalence of food insecurity and have resulted in extensive media coverage. However, while food security is a multidimensional and interconnected topic, many current media reports focus on ‘single issue’ aspects of the problem. We came together as a multidisciplinary team to put together a massive open online course (MOOC) on the topic of food security which ran from 2014 to 2016. Our original aim was to help the public better understand the breadth and complexity of this topic. However, we discovered that we also learnt a lot from the participants and each other through engaging with alternative perspectives on the topic. Here we reflect upon the diverse forms of learning which were catalysed through the MOOC.

Massive open online courses are no cost courses which provide e-learning resources to anyone who registers. They are typically run by partnerships between universities and e-learning providers and have large numbers of participants (more than 500) (Hew & Cheung, 2014) from across the world. Proponents of MOOCs believe they offer a range of advantages including making education available to those who may not be able to access it in other ways, increasing the prestige of institutions, allowing institutions to market themselves and allowing academics to experiment with different approaches to teaching. Importantly, MOOCs are also a way to offer a less ‘top down’ form of pedagogy in favour of a format in which people are able to learn through sharing with each other.

Our MOOC was offered on the platform FutureLearn ([www.futurelearn.co.uk](http://www.futurelearn.co.uk)). FutureLearn offers free access to MOOCs for registered users with an upgraded version offering course certificates, access to course tests and extended access to materials. Our course, entitled ‘Global Food Security’, ran on the platform for three years, 2014-2016. The course was eight weeks long, with a different topic covered each week (Table 1). Eight weeks is quite a long course for this type of short course as many are three or four weeks in duration but we felt the length was justified by the content of the course. Each week’s learning programme was made up of a series of steps with learning materials including videos, articles written for the platform, links to articles available online, discussions and quizzes. The course bought together an interdisciplinary team of academics from plant and crop science, ecology and social science to lead the course and included materials produced in collaboration with a wide range of academics and industry professionals, all of whom had an interest in aspects of food and its production.

**Table 1.** Modules on the Futurelearn course ‘Global Food Security’.

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| Week | Topic |
| 1 | The food security challenge |
| 2 | Producing more food |
| 3 | Sustainability matters |
| 4 | Food waste |
| 5 | Safe and nutritious food |
| 6 | Challenges facing our food system |
| 7 | Fixing our broken food system |
| 8 | Looking to the future |

As with many MOOCs, the course attracted high numbers of learners but also had a high dropout rate (Hew & Cheung, 2014). In 2014 4958 people joined the course and 2739 actively participated (henceforth called learners). This rose to 9108 in 2015 with 3046 learners and then fell again to 4721 in 2016 with 2089 learners, numbers much higher than could be reached in conventional higher education courses. Data collected by FutureLearn indicated participants were located in 182 different countries, a statistic which supported our contention that food insecurity is a challenge for societies in both developed and developing countries around the world and that an open access, on-line delivery platform was an ideal means of delivery of this learning material.

In 2015 and 2016 a feature was introduced into the programme of work for week 8 which asked learners to indicate to the delivery team what they had learnt by participating in the course. We asked the following question: “Are your perspectives on food security similar to when you enrolled on the course or have your feelings changed at all? If they have changed, please try to tell us how and why.” In 2015 148 responses were collected from 127 learners and in 2016 99 responses from 87 learners. Comments were read and key themes that emerged were identified. The comments were then read a second time and the number of times the themes were mentioned was recorded. A single comment could mention multiple themes. Learners quoted all gave permission for their quotes and names to be used.

A total of 32 respondents in 2015 and 14 respondents in 2016 specifically addressed the question of whether their perspective had changed. However, although many respondents did not directly answer the question, others identified an increase in their knowledge of either the topic of food security broadly (53 in 2015, 38 in 2016) or specific aspects of the course (29 in 2015, 16 in 2016). Of the 46 respondents that addressed whether their perspective had changed 27 said that it had (20 in 2015, 7 in 2016). Two example quotes are given below:

*“My perspectives on food security have certainly changed since enrolling on the 'Global Food Security' course. Before now, I was aware of some of the difficulties faced in the ongoing battle for food security and sustainability. On this course, not only did I learn far more about these battles but about the sheer volume of potential approaches and solutions to these problems, on both a local and global level.”*

Monica Thomas, learner, 2015

“*My perspectives on food security has changed a lot after joining this course. Thank you for such an amazing and informative course. Before starting the course, to be honest, I knew very little about this topic. And my idea was quite simple, and obviously not correct - we should produce more food to solve the food security changes. During the course, I've explored some interesting and eyeopening aspects of food security with you, from food waste, to healthy diet, to organic farming, to school farms, etc., these absolutely widened my thoughts on this matter. If now someone asks me "tell me something about food security", I'll probably keep talking for an hour about all the things I've learnt in this course!*”

Weifan Liu, learner, 2016

Forty-six learners stated that their perspective had not changed. However, this did not mean that no learning had taken place: many reported developing a more nuanced understanding of the issues and a greater awareness of other perspectives. Importantly, these enhanced perspectives seemed to come about not just through the course content but also through interactions with learners from across the world.

“*This course has been really interesting - I wouldn't say my perspective has changed much, but it has confirmed my feeling that we should all be cutting back on animal produce, shortening the supply chain, wasting less and being very judicious about the food we consume that has traveled a long way. I have particularly valued discussions with students from different parts of the world or who bring personal experience of being involved in food production.*” Ann Cooper, learner, 2015

There were several other themes that emerged from the comments. One of these was recognition that food security is a very complex problem. This was identified by 21 respondents (13 in 2015, 8 in 2016), for example:

“*It has been an amazing journey enrolling on this course. I use to think always that food security is something simple but it entails a lot. It has been an eye opener especially on articles on food waste! I have been touched on measures that needs to be put in place in other to reduce food waste*.”

Paul Garcia, learner, 2015

Another common theme was how the course made students consider the future (15 in 2015, 7 in 2016). For some this was just reflection but others expressed a desire to be more proactive, either by changing their own habits or those of their family, or by joining groups that support relevant causes:

*“I learned so much new information during this course that it definitely changed my perspective on food security. I have become much more aware of environmental issues and how they impact food security around the world. In my home, because of this class, we have made changes in what and how much food we buy so that we can cut down on our waste.”*

 Trenton White, learner, 2015

Six participants also identified the relevance of the course to their personal development, current studies elsewhere or career progression.

The MOOC involved a lot of staff time in the production of materials. However, our course ran for three years and reached a very large number of students. Another benefit was the learning we gained as academics. This was partly because our diverse audience of learners interacted regularly with posts, thus giving us a unique insight into their perspectives and concerns. Developing the MOOC also required a greater degree of interaction between us as a staff team, partly because of the novel format, and partly because the MOOC involved some live discussions between us (for example, we held a live Google Hang-Out during the course). These discussions provided a new opportunity for us to explore and reflect upon the ways in which we were understanding, framing and presenting food security issues through our teaching. As with the learners, having these discussions didn’t necessarily mean that we began to magically agree on the issues, however, it did give us a better appreciation of why others experience things differently and hence a better platform for engaging with colleagues and students in interdisciplinary debates on these issues. Some of us also changed our buying habits even though we thought were already ‘informed’ on these issues.

It is clear from the feedback received at the end of the course that many of the students found the MOOC an enjoyable and rewarding way to learn about food security. The course also reached large numbers of students. Importantly the course allowed those who were new to the topic to learn about different components of the food system and the challenges of food security, and in certain cases, to change their perspective. In particular it allowed students to appreciate the tensions between different components of the food system which can lead to trade-offs and in some cases, conflicts. It also allowed those with existing knowledge of the topic to build upon what they already knew, developing new knowledge on specific aspects of the topic and reinforcing existing opinions. We hope that as a result of participating in the course, many of these people can go on to ‘change the world’ or at least their small part of it.

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