

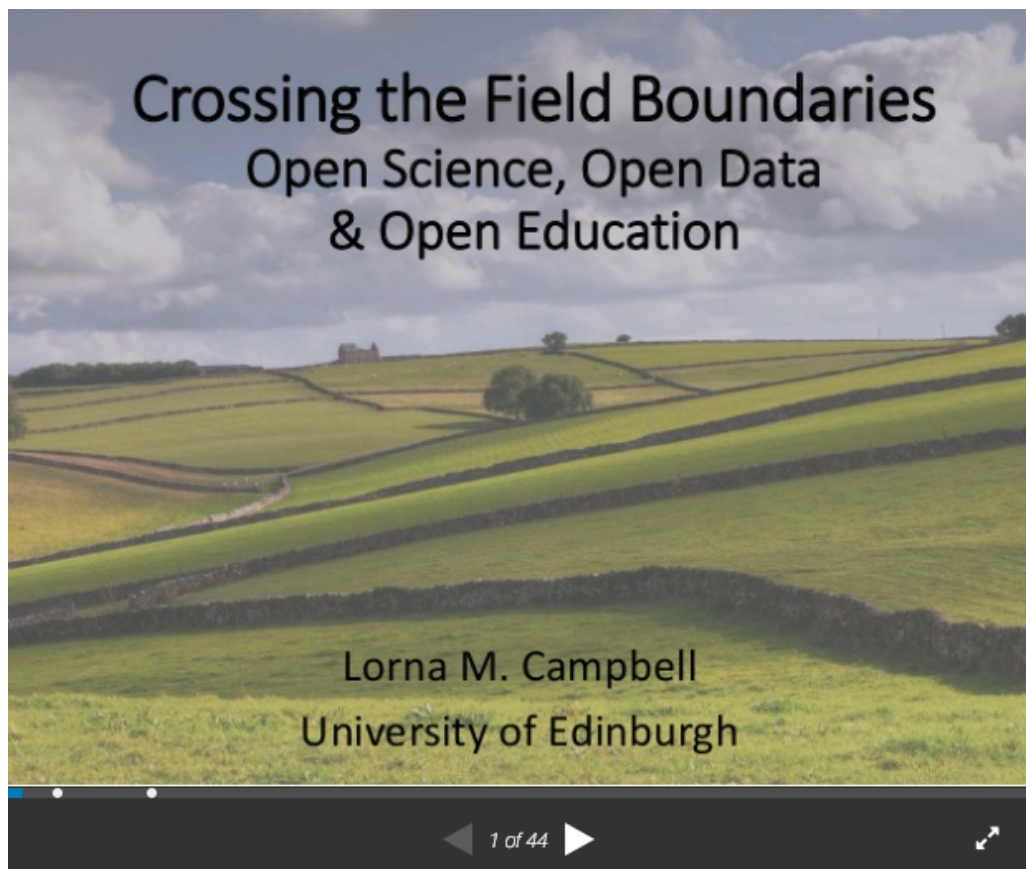
# Crossing the Field Boundaries: Open Science, Open Data & Open Education

Lorna M. Campbell

## Editor's Note

This was originally posted to [Lorna M. Campbell's blog](#) on March 28, 2017.

*Last week I was invited to speak at the [International Open Science Conference](#) in Berlin which this year had a special focus on OER. My talk featured a case study of the University of Edinburgh's [Geoscience Outreach and Engagement Course](#) so I'd like to thank Colin Graham and all those involved in the course for allowing me to present their inspirational work.*



[Crossing the Field Boundaries – Open Science, Open Data and Open Education](#) from [Lorna Campbell](#)

This talk focuses on the interface between OER, open data and open science and our experience at the University of Edinburgh of promoting open education through the School of GeoSciences Outreach and Engagement course.

The title of this paper, “Crossing the field boundaries”, comes not from the domain of GeoSciences though, but from [Maryam Mirzakhani](#), professor of mathematics at Stanford University and the first female winner of the Fields Medal. In a 2014 interview Maryam said

*“I like crossing the imaginary boundaries people set up between different fields—it’s very refreshing. There are lots of tools, and you don’t know which one would work. It’s about being optimistic and trying to connect things.”*

[A Tenacious Explorer of Abstract Surfaces](#), *Quanta Magazine*, August 2014

I am not a mathematician, or a scientist, but I do have some experience of crossing field boundaries, and since open education is all about breaking down boundaries and cutting across fields, this seems like a nice metaphor to hang this talk on.

I’ve worked in open education technology for a long time now, but like most education technologists my background is not originally in either education or technology. In my case I started out as an archaeologist. I studied archaeology at the University of Glasgow and after working there as a field worker and material sciences technician for a number of years, I decided to cross over into another field, and by rather circuitous routes I found myself working in open education technology. Over the intervening years I’ve developed a strong personal commitment to openness in education, and I firmly believe that we have a moral and ethical responsibility to open access to the outputs of publicly funded education, research and science.

We’ve already heard a lot about the benefits of OER over the last two days so I’m not going to labour the point, however I just want to highlight this quote from the [Scottish Open Education Declaration](#) as it neatly encapsulates the affordances

of OER:

*Open education can expand access to education, widen participation, create new opportunities for the next generation of teachers and learners and prepare them to become fully engaged digital citizens. In addition, open education can promote knowledge transfer while at the same time enhancing quality and sustainability, supporting social inclusion, and creating a culture of inter-institutional collaboration and sharing.*

#### [Scottish Open Education Declaration](#)

Institutions are already being encouraged to adopt open research policies and to publish publicly funded research outputs under open licences; similar policies and initiatives are required for open educational resources. Although open access, open education and open data have all made significant progress in recent years, there has been a tendency for these domains to progress in parallel with little sign of convergence. In the UK, Research Council mandates may have had a positive impact on open access and open research data, however the connection has yet to be made to open education and as a result there is a tendency to end up with “open silos”. Indeed open access mandates may even have a negative impact on open education, as institutions focus their efforts and resources on meeting these requirements, rather than on ensuring their teaching and learning materials are appropriately licensed and shared online as OER. So while it’s great that institutions are now thinking about how they can link their open research data with open access scholarly works, we also need to focus attention on linking open data to open education.

While the benefits of open data are widely recognised in relation to scientific and scholarly research, open data also has considerable value in the context of teaching and learning. Many governments, non-governmental organisations and research centres are already producing large volumes of open data sets that have the potential to be used as open educational resources. Scenario based learning involving messy, real world data sets can help students to develop critical data literacy and analytical skills. Using open data introduces an invaluable element of realism and complexity as the data is flawed and inconsistent. Students come up against challenges that it would be difficult to reproduce artificially and, as a result, they learn to deal with the kind of problems they will encounter in the real world. And perhaps more importantly, working with real world open data from real governments and communities doesn’t just help students to develop data literacy skills, it also helps to develop citizenship, social responsibility and community engagement.

In an influential report by the [Open Knowledge Open Education Working Group](#), Javiera Atenas and Leo Havemann noted that

*Educators who make use of Open Data in teaching and learning encourage students to think as researchers, as journalists, as scientists, and as policy makers and activists. They also provide a meaningful context for gaining experience in research workflows and processes, as well as learning good practices in data management, analysis and reporting.*

[Open Data as Open Educational Resources: Case studies of emerging practice](#), Javiera Atenas & Leo Havemann (Eds)

Despite these acknowledged benefits, there is still a tendency to conceptualise OER as what Atenas and Havemann describe as “educator-produced learning materials” – resources created by *teachers* for use by *students*. However if we simply replicate existing academic modes of production through open education, then we’re missing a trick. One of the most important aspects of openness is the ability to break down boundaries and cut across fields. So I want to present a case study from the School of GeoSciences at the University of Edinburgh that does just that.

Open knowledge, open access and open education are central to the University of Edinburgh’s [Strategic Vision](#). In support of this vision, the University host a range of open initiatives and services including an [Open Knowledge Network](#), an [Open Research Repository](#), an [Open Data Repository](#), a [Wikimedian in Residence](#), a [Citizen Science and](#)

[Crowdsourced Data and Evidence Network](#), open archives and [collections](#), a wide range of [MOOCs](#), and [Open.Ed](#) a one stop shop providing access to the University's open educational resources.

The University's vision for open educational resources builds on three strands:

- The history of the Edinburgh Settlement.
- Excellent education and research collections.
- Traditions of the Enlightenment and the University's civic mission.

The University has established an [OER Service](#) that provides support frameworks to enable staff to share OER created as a routine part of their work, and to find and use high quality teaching materials developed within and beyond the University.

The service showcases Edinburgh at it's best, highlighting the highest quality learning and teaching; identifying collections of learning materials to be published online for flexible use, and enabling the discovery of these materials to enhance the University's reputation.

And as a contribution to the University's civic mission Edinburgh is opening access to its treasures, making available collections of unique resources to promote health, economic and cultural well-being; digitizing and sharing major collections of unique archives and museum resources to encourage public engagement with learning, study and research.

In order to ensure Edinburgh's OER Vision is sustainable and supported across the institution, the University has an accompanying [OER Policy](#) that encourages staff and students to use, create and publish OERs to enhance the quality of the student experience and to help colleagues make informed decisions about creating and using open educational resources in support of the University's OER Vision.

One of the key aspects of Edinburgh's open strategic vision is to engage with and benefit communities outwith the institution. The university is not alone in this; there are moves towards increasing community engagement right across the higher education and research sector. At the same time, universities are rethinking how degree programmes are structured and are moving beyond traditional knowledge based courses in order to accommodate self directed learning, enable learning for life, empowering students to co-create their own education and build student capital.

One initiative that does just that is the [School of Geosciences Outreach and Engagement Course](#) developed by the Geoscience Outreach Team. (list members on slide). This optional project based course for final year Honours and taught Masters students, has been running for a number of years and attracts students from a range of degree programmes including Geology, Ecological and Environmental Sciences, Geophysics, Geography and Archaeology. Over the course of two semesters, students design and undertake an outreach project that communicates some element of the field of GeoSciences outside the university community. Students have the opportunity to work with a wide range of clients including schools, museums, outdoor centres, science centres, and community groups, to design and deliver resources for science engagement. These resources can include classroom teaching materials, leaflets, websites, smartphone/tablet applications, community events, presentations or materials for museums and visitor centres. Students may work on project ideas suggested by the client, but they are also encouraged to develop their own ideas. Project work is led independently by the student and supervised and mentored by the course team and the client.

This approach delivers significant benefits not just to students and staff, but also to the clients and the University.

Students have the opportunity to work in new and challenging environments, acquiring a range of transferable skills that enhance their employability. They also gain experience of science outreach, public engagement, teaching and learning, and knowledge transfer while at the same time developing communication, project and time management skills.

Staff and postgraduate tutors benefit from disseminating and communicating their work to wider audiences, adding value to their teaching and funded research programmes, supporting knowledge exchange and wider dissemination of scientific research.

The client gains a product that can be reused and redeveloped, new partnerships are formed, new education resources created, and knowledge and understanding of a wide range of scientific topics is disseminated to learners, schools and the general public.

The University benefits by mainstreaming community engagement, and embedding it within the curriculum. The course also provides the opportunity to promote collaboration and interdisciplinarity across the University and helps to forge relationships with clients.

In the words of GeoSciences Brian Cameron, MBE:

*"the University and the students create a legacy of knowledge transfer and cooperation that benefits all."*

The Geosciences Outreach and Engagement course has proved to be hugely popular with both students and clients. The course has received widespread recognition and a significant number of schools and other universities are exploring how they might adopt the model.

Here's just a few quotes from students who have taken the course;

*"It has been good to take my learning out into the community and give something back"*

*"By taking this course, not only was I, as the student, able to learn about the values and excitement of public engagement with other disciplines, but I also developed a working tool for further scientific engagement for a new audience." (Jane Robb)*

*"Geoscience Outreach and Engagement is one of the most interesting courses I have undertaken in my 5 years at Edinburgh. Not only do I get the opportunity to find new and exciting ways to inform people of all ages about Geosciences, I'm also learning valuable skills to enhance my future career after university. This course has taught me that everyone has a different way of learning, and instead of following one strict path, we should expand our ideas on how to effectively communicate science to the general public." (Rebecca Astbury)*

Feedback from the clients was equally enthusiastic:

*"The student has done a wonderful job and we now have a new resource that we can use for years to come" (Class teacher)*

*"We have appreciated the joint work with the School of GeoSciences and the experience has given me a new avenue in my own teaching to explore vis-à-vis practical hands-on experiments. S1 classes all did a practical demonstration of the erosion processes in rivers for example." (Class teacher)*

*"She was an excellent ambassador not just for the university but for women in science and I feel she set a good example for a few of the girls in the class who are embarking upon geography and earth science studies and who may well now add geology to their subject choices. " (Class teacher)*

A key element of the Geosciences Outreach and Engagement Course is to develop resources with a legacy that can be reused by the client and developed and disseminated further for use by other communities and organisations. The University is now taking this one step further by repurposing some of these materials to create open educational resources. Last year we recruited an Open Content Creation intern, undergraduate Physics student Martin Tasker, whose job it was to take some of the materials created by the Geoscience students, make sure everything in those resources could be released under open license and then share them in places where they could be found and reused by other teachers and learners.

So here for example is a resource on [sea level variation](#) developed by student Roseanne Smith. The resource covers glaciation, global warming, and isostasy and it includes a lesson plan, a PowerPoint presentation, printable photographs and questions, a student workbook, and a timeline to illustrate geological timescales. The course is designed for

students learning Geography at third and fourth level of the Scottish Curriculum for Excellence and it can be downloaded under a CC BY Share alike license from Open.Ed and [TES](#). And there are other resources of this kind.

One of the things that was really inspirational about this initiative is that as part of his internship, our student was asked to reflect on his experience of the project and what he learned from it, and I think it's worth taking a little time to listen to Martin's thoughts.

This first quote is taken from a blog post our student wrote at the start of his internship where he talks about how he had already engaged with OER. Before becoming an undergraduate, he had looked at MOOCs and OERs from various universities to find out more about subjects and course he was interested in.

*"Open education has played such an integral part of my life so far, and has given me access to knowledge that would otherwise have been totally inaccessible to me. It has genuinely changed my life, and likely the lives of many others. This freedom of knowledge can allow us to tear down the barriers that hold people back from getting a world class education – be those barriers class, gender or race. Open education is the future, and I am both proud of my university for embracing it, and glad that I can contribute even in a small way. Because every resource we release could be a life changed. And that makes it all worth it."*

[A Student's Perspective on Open Education](#), Martin Tasker

So that was the place where our student intern started out from, he was obviously every much on board with open education and OER right from the start. And this second quote is from his final blog post "Wrapping up my time as open content intern"

*"Open Education is a large part of the reason I'm at Edinburgh studying physics, and I firmly believe that it is one of the keys to widening participation in education in a meaningful way. The proliferation of the internet among all classes in society means that a savvy university can reach those that would previously have had little access to education beyond their school years. And with our work in OERs, we can hopefully feed back some of the expertise of our academics into the classroom, raising the standard of teaching and taking some of the pressure off extremely overworked teachers."*

[Wrapping Up: My Time as an Open Content Curator Intern](#), Martin Tasker

One of the things I really like about these two quotes is that, I have worked in open education for over ten years now but I don't think I could have articulated any more clearly why open education and OER is so important. The Geosciences Outreach and Engagement course provides an excellent example not only of community engagement and knowledge exchange up also of involving students in the co-creation of their learning experience more widely.

#### **Additional References**

- [GeoScience Outreach and Engagement Insight Paper](#), Institute for Academic Development
- [Building Student Capital Through Student-Led Outreach, Engagement and Learning Development](#) by Colin Graham



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