

Towards open knowledge: Opportunities and challenges for education

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It was with the advent of the public internet in the 1990s and the access it provided to a previously unimaginable wealth of information that the current open movement was conceived. Open knowledge, which lies at the heart of the open movement, refers to knowledge (here interpreted broadly to include data, content and information) that is free to use, reuse, remix, and redistribute without restrictions. As such, it represents an alternative to the intellectual property approach to the production and distribution of information, and a movement away from the individual ownership of information towards a more collective or distributed model.

The possibilities enabled by open knowledge, and in particular the ability to reuse and reconceptualise information without concern for copyright laws, have been embraced by research and development efforts, especially in the areas of science and technology. Open source models and associated applications – including open publishing, open access, open archiving, open repositories, and open data banks – coupled with Web 2.0 technologies, have seen linear models of knowledge production give way to more diffuse, open-ended, decentralised knowledge processes. This has enabled the emergence of distributed knowledge and learning systems that support cross-border international collaborations. Increasingly, the products and new knowledge developed through open source models rival the quality of those produced by proprietary efforts.

Since the early 2000s, the combination of new technologies and the new ways of licensing content and information associated with open knowledge have spurred new educational initiatives and approaches, often termed ‘open education’!¹ One of the earliest educational endeavours to utilise open knowledge was MIT OpenCourseWare, launched in 2001 as an initiative to put all of the educational materials from MIT’s undergraduate and postgraduate courses online, allowing anyone to access and use the materials free of charge. Other open education initiatives include open educational resources (OER), which are digitised materials that are ‘freely and openly available for educators, students and self-learners to use and reuse for teaching, learning and research’.² And more recently, MOOCs (massive open online courses) allow anyone with a digital device and internet connection to access learning opportunities, many of which are offered by elite universities.

Proponents of open knowledge in education believe it has the ability to democratise education by enabling anyone to access high-quality educational materials, regardless of location, background, prior qualifications or financial considerations. As such, open education initiatives could provide new ways of addressing significant challenges facing education, counteracting geographical barriers, facilitating collaboration with and between ‘experts’, enabling ‘universal’ access, and overcoming economic impediments. To date, open educational models primarily have been the domain of higher and further education. In school-level education, especially in New Zealand, open education and open knowledge is yet to make much of a mark. However, with the challenges currently facing the New Zealand school system, it is worth exploring the possibilities and potential offered by open knowledge and open education.

Financial constraints, an escalating teacher shortage, reports of increasing teacher workloads, a low-equity schooling provision with substantial inequities in opportunities and outcomes, as well as new demands such as a growing focus on globalisation and the (apparent) need for new skills, knowledge and expertise, represent major challenges for the New Zealand school system. While there is no such thing as a silver bullet in education, it is worth considering how open knowledge and open education might be positioned to address some of these challenges. The remainder of this chapter provides an initial exploration into the opportunities that open educational initiatives, in particular OER, open online courses and learning, and citizen science could bring to school-level education in New Zealand, as well as the potential pitfalls and limitations of these models.

Challenging the 'egg-crate' model of teaching and learning in schools

Knowledge sharing among teachers has long been constrained by the 'egg-crate' model of schools, where teachers work primarily in isolated classrooms with limited opportunities to discuss their practice or to collaborate on teaching strategies. According to Ann Lieberman and Lynne Miller, the isolation of teachers and teaching in individual classrooms has led to the development of 'remote, oblique and defensively protective' relationships between teachers, where privacy rules interactions and knowledge is not freely or openly available or shared.³ Furthermore, the 'localness' or context-rich nature of teaching and teacher knowledge, where what works in one classroom or school does not always neatly transfer to another classroom or school, also complicates knowledge sharing.

Open knowledge and more particularly OER have the potential to challenge the isolationist and individual approach to knowledge production and knowledge use in schools and to foster a more collaborative and collective approach to teaching and learning. The Cape Town Open Education Declaration (2008), a founding document of the OER movement, suggests that open education has the potential to 'empower educators to benefit from the best ideas of their colleagues' and to adopt 'new approaches to assessment, accreditation and collaborative learning'.⁴ The emergence of technology and licensing that allows a resource to be reused, remixed and redistributed results in what Anderson has termed the 'Long Tail' phenomenon; the unlimited availability of resources and individual choice in how they will be utilised.⁵ OER provide access to a huge array of ready-made, teacher-created materials, whilst also maintaining the autonomy of individual teachers to (legally) repurpose and adapt the materials to suit their own contexts and needs.⁶

OER and the open educational practices they encourage provide a valuable means for connecting teachers and facilitating the sharing of their knowledge and ideas. They also have the potential to reposition teachers and the knowledge they create for, in and through their teaching practice, offering them the opportunity to collectively add to the professional project of teaching. The collaboration and collective knowledge OER can engender and the focus on collective rather than individual resources and knowledge for teaching challenges the interschool competition established in New Zealand since the advent of Tomorrow's Schools. They instead suggest that resources and teacher knowledge should serve all students, teachers and schools by being openly available to all, and potentially could facilitate a shift in mindset away from seeing a teacher's responsibility as just to the students in their classes and towards a responsibility for supporting all students in New Zealand.

While OER have the potential to facilitate distributed learning and knowledge production and to lighten the load for teachers by providing ready access to content and materials, their implementation also faces significant challenges. There are implicit tensions in OER for and by teachers. As Michael McShane explains:

[There] is a central tension that plagues the open-resources movement: teachers want free, high-quality resources, but the people who create them want to be paid for doing so. Creating high-quality educational content is not like editing a Wikipedia page. Yes, it requires expertise, but it also requires creativity and pedagogical smarts. Content must be sequenced and aligned with the learning goals articulated in state standards. It must be supported by activities, handouts, quizzes, PowerPoint slides, and so on. As any teacher will tell you, content development takes time.⁷

McShane identifies not only the time and considerable knowledge and expertise that goes into making high-quality teaching and learning resources (and the tension of creating and sharing resources effectively for free) but also that a single resource in and of itself is only of so much use to a teacher. The power of any teaching and learning resource is all the other factors that support its implementation – its alignment to particular learning needs and learning contexts, its relationship to what is taught immediately before and immediately afterwards, and its alignment to a teacher's individual pedagogical style and approach.

The use of OER is further challenged by the huge number of resources available (by some estimates there are more than one billion pieces of educational content available in the open resources infrastructure⁸) and the resulting issues around ensuring the quality of OER, and the effective indexing of resources. This issue of how to vet and validate the knowledge teachers produce is not restricted to OER. As Harvard Graduate School of Education's Catherine Snow explains:

Teacher practices get developed but there is no mechanism to distinguish and vet them. There is no way to elevate and replicate. Even if there is some evidence that something works, the chaos and lack of respect for teacher professionalism almost inevitably undercut this knowledge.⁹

Opening access, removing barriers

New technological infrastructure and digital technologies and the open education initiatives they support are, at least in theory, removing barriers to accessing learning opportunities. As Neil Selwyn observes: 'The ever-expanding connectivity of digital technology is recasting social arrangements and relations in a more open, democratic, and ultimately empowering manner.'¹⁰ Indeed, it is now possible for anyone with a digital device and an internet connection to access a wealth of learning and educational materials that were previously inaccessible. Geographical, temporal and economic barriers that previously restricted access to educational opportunities have been diminished. Furthermore, open online learning is not only providing wide-scale access, but also enabling new approaches to learning and the repositioning – if not in practice then at least in theory – of learners, educators and institutions.

Learners increasingly have the flexibility to determine when, where and in what ways they engage, giving them greater control over their learning. This enables learning to transcend the boundaries of the school building and the school day. Take, for example, the 'flipped classroom' approach where students engage with content (typically access online) at home before using this content in a more hands-on, active and collaborative way during school lessons. Open knowledge and education also offers the potential for the greater personalisation of learning opportunities, enabling students to work at their own pace and potentially in non-linear ways.

While offering numerous opportunities, open online education also faces substantial challenges. Successful and effective large-scale online education is expensive and notoriously challenging to produce and deliver.¹¹ To cover these costs providers increasingly are turning to 'freemium' models, offering a reduced service free of charge but charging for the full product or experience. And even where access is truly open, the outcomes of a particular learning experience will differ considerably depending on the student and his or her ability to learn. The same factors that limit students' ability to engage in offline learning also impact their ability to learn in online environments, leading to what Selwyn describes as 'inequalities of participation'.¹²

Tressie Cottom argues that online systems get designed and configured to 'the norm' of a self-motivated, highly able individual who is 'disembodied from place, culture, history, markets and inequality regimes'.¹³ That is, those who are most able to benefit from open knowledge and open education are people who have the social and educational capital to engage with the learning opportunities presented. So while open learning does break down multiple barriers to engagement and access, it does not, in and of itself, address barriers to participation in and with knowledge and learning that continue to plague our school system.

Citizen science: Promoting real-world participation

The merging of boundaries between schools and the real world has become an increasingly popular refrain in education. *The New Zealand Curriculum Update 26* states:

Twenty-first century learners need access to a wider range of resources and expertise than in the past. Educational professionals will need to collaborate with other people and groups who can provide access to specific kinds of expertise, knowledge, or learning opportunities. The community or wider public will also need to be on board with new thinking about education in order to support schools to become more future oriented.¹⁴

Expanding the boundaries of schools and engaging more closely with external experts and contexts provides students with access to new knowledge and forms of learning. Citizen science, an open knowledge initiative, provides an avenue for enabling students and teachers to engage with experts and opportunities outside of their immediate school context.

Citizen science refers to research collaborations between scientists and non-scientist volunteers, involving the collection and analysis of data and providing open access to these data. This has the potential to enhance the science education infrastructure in schools by promoting closer links with universities and research institutions, and broadening the scope of the science curriculum. Citizen science provides school students with the opportunity to connect with experts from across New Zealand and the world, and to contribute in a meaningful way to advancing science. While the benefits of citizen science are undeniable, Michael Peters offers a reminder of the duties that come from involvement in open science initiatives:

An emerging challenge of citizen science is its deployment in education at all levels to promote participatory scientific practices integrating school, STEM education and environmental science and green studies at university to promote DIY science for local communities that encourages committed and objective, disinterested research based on rigorous and systematic data collection on the one hand, and, on the other, environmental responsibility for an action agenda—an indissoluble link carrying an ethical and political obligation to act on results.¹⁵

Connecting science education with real-world problems brings immense educational opportunities – as well as real-world ethical obligations.

Towards openness and participation

Open knowledge and associated open education initiatives offer considerable possibilities for school-level education in New Zealand. They provide the opportunity to participate in real-world learning and experiences, to collaborate with experts and colleagues from around the world, and to access to a wealth of resources and materials. There is much to applaud in the open movement and its democratising agenda, and the New Zealand school system and those involved in it would do well to consider how to make better use of the knowledge and opportunities it presents. In doing so, however, it is important not get swept away in the often uncritically enthusiastic rhetoric. While open education does provide (largely) free access to opportunities to learners, it is important to recognise that the financial costs of providing these opportunities and knowledge are still borne by someone or some institution.¹⁶ Similarly, while anyone is able to access open educational opportunities and to engage with and contribute to open knowledge, in reality it is those who already have the necessary knowledge, skills and expertise who are able to make best use of these. For open knowledge and open education to achieve their aims of opening both access and participation, it is necessary to overcome many of the barriers that continue to dog more traditional educational systems.

1. The origins of open education may be traced back to early distance learning enterprises that originated in the 18th century as correspondence courses using the postal system, and later utilised radio and television broadcasts, and more recently online learning. The first recorded instance of distance learning comes from Boston in 1728, when Caleb Phillips advertised private correspondence courses in the *Boston Gazette*. Correspondence education expanded extensively throughout the 19th century, and in 1969 the UK Open University became the first institution to deliver only distance learning, a model that soon spread to other countries, including Canada and Germany. The Open University also pioneered admission without qualifications and the concept of degrees awarded through modular source work.
2. OECD. (2007). *Giving knowledge for free: The emergence of open educational resources*, p. 10. Retrieved from http://www.oecd.org/document/41/0,3746,en_2649_35845581_38659497_1_1_1_1,100.html
3. Lieberman, A., & Miller, L. (1990). Restructuring schools: What matters and what works. *Phi Delta Kappan*, 71, 759–764.
4. Cape Town Open Education Declaration: Unlocking the promise of open educational resources. (2008). Retrieved from <http://www.capetowndeclaration.org/read-the-declaration>
5. Anderson, J. (1982). Acquisition of cognitive skill. *Psychological Review*, 89(4), 369–406.
6. It should be noted that the sharing of materials between teachers is not a new practice and that the majority of these materials are not OER. Further, teachers typically utilise materials made by others without referencing the original source.
7. McShane, M. (2017). Open educational resources. *Education Next*, 17(1). Retrieved from <https://www.educationnext.org/open-educational-resources-digital-textbooks-federal-government>
8. Ibid.
9. Interviewed in Mehta, J., Theisen-Homer, V., Braslow, D., & Lopatin, A. (2015). *From quicksand to solid ground: Building a foundation to support quality teaching*. Transforming Teaching White Paper, p. 19.
10. Selwyn, N. (2013). *Education in a digital world: Global perspectives on technology and education*. New York: Routledge, p. 2.
11. Ferguson, R. & Sharples, M. (2014). Innovative pedagogy at massive scale: Teaching and learning in MOOCs. In C. Rensing, S. de Freitas, T. Ley, & P. J. Munoz-Merino (Eds.), *Open learning and teaching in educational communities: Proceedings of the 9th European conference on technology enhanced learning, EC-TEL 2014, Graz, Austria, September 16–19, 2014* (pp. 98–111). Cham, Switzerland: Springer.
12. Selwyn, N. (2016). *Is technology good for education?* Cambridge, UK: Polity Books, p. 31.
13. Cottom, T. (2014, July 29). *Democratising ideologies and inequality regimes*. Paper presented at the Berkman Centre for Internet & Society Series, Harvard University, Cambridge, MA.
14. Ministry of Education. (2012, October). Future-oriented views of knowledge and learning. *The New Zealand Curriculum update 26*. Retrieved from <https://nzcurriculum.tki.org.nz/Curriculum-resources/NZC-Updates/Issue-26-October-2012/Future-oriented-views-of-knowledge-and-learning>
15. Peters, M. (2012). Citizen science and ecological democracy in the global science regime: The need for openness and participation. Unpublished paper, p. 3.
16. In the case of MOOCs, for example, it is primarily elite institutions and multinational corporations that dominate the market, leading some to claim they are attempting to colonise (or at least capture) the education market.